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1. Purpose

The Investment Plan provides the fiscal year 2019 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 a future economic climate, modifications to the plan may be necessary. Modifications will be communicated to the Retirement Board in monthly reviews of the plan as needed.
2. Fiscal 2019 Investment Plan Overview

**ECONOMIC OVERVIEW**

Led by the United States, economic growth around the world has accelerated since early 2016. The fits and starts from U.S. economic growth over the first seven years of the current nine-year expansion has transitioned into an economy that is notably growing above its long-term potential with positive signs that economic conditions will remain strong through fiscal 2019. Inflation pressures have grown and that will continue to push the Federal Reserve on its course of gradually restrictive monetary policy. The personal and business tax reforms and tax cuts implemented in the United States should support the economy through most of the fiscal year, but those gains will likely ease late in the year. Nonetheless, even with a loss of fiscal and monetary policy stimulus, the United States should reach a new economic expansion duration record in fiscal 2020 due to a low recession risk. Economic activity in other developed countries should improve as restrictive monetary policy remains off in the future. Emerging countries will likely have mixed results.

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

- **U.S. real gross domestic product (GDP)** is expected to grow 2.7% in fiscal 2019 after advancing an estimated 2.9% in fiscal 2018. Private domestic final sales growth (that excludes volatile inventory changes, government spending and foreign trade from GDP) should grow by a strong 3.1% in each fiscal year. While consumer spending accelerates in fiscal 2019 from solid employment and tax cuts, business investment should remain strong through most of the year. The housing sector faces challenges from short supply and higher interest rates, but the growing economy will provide underlying support. United States’ trade should continue to detract from economic growth and faces significant risks from reciprocal trade protectionism to potential Trump administration policies.

- **Amid steady economic progress in all developed countries**, real GDP growth in the eurozone should reach closer to full potential. That should help support global commodity prices that, in turn, fosters economic growth in commodity-rich developed countries like Australia and Canada. Inflation should inch up everywhere, but major central banks like the European Central Bank (ECB), the Bank of England (BoE) and the Bank of Japan (BoJ) should continue with easy monetary policies even as they signal future policy changes once risks to growth gradually subside.
• Economic growth across emerging countries will vary. Guidance from China’s policymakers for long-term trend growth will be in the mid-to-lower end of a 5.5–6.5% range, but over the fiscal year, growth may marginally surpass the upper end of the range as cyclical reflation gradually lessens debt-related risks that built up in recent years. India will likely post stronger growth than that of other BRIC (Brazil, Russia, India and China) countries where political problems continue to hinder progress. The main economic risk to global growth is that the potential for protectionism may weaken business confidence and subdue investment by creating uncertainty about economic policies.

• U.S. inflation should accelerate beyond the Federal Reserve’s target of 2% growth and into the mid-2% range throughout fiscal 2019. In response, the Federal Reserve should continue its gradual increases in the federal funds rate to control subsequent inflation and provide a cushion when needed for future monetary policy stimulus. The federal funds targeted rate could end fiscal 2019 in the 2.75–3% range from today’s 1.5–1.75%. Adjustments to the Federal Reserve’s balance sheet to remove some of its past quantitative easing will likely continue through the end of 2020 and, perhaps, into 2021.

• U.S. fiscal 2019 growth in the 2–3.5% baseline range carries about an 80% chance of occurring. A recession or near-recession risk carries about a 10% chance of occurring while greater-than-expected strength carries a similar chance. The baseline forecast has nominal GDP growth of 5% made up of 2.7% real GDP growth and 2.3% GDP price index growth. The Blue Chip Economic Indicators consensus forecast of 4.9% nominal growth expects 2.7% real GDP growth and 2.2% GDP price index growth. Consumer prices, however, are expected to grow by 2.4% in the STRS Ohio forecast while the consensus view calls for a smaller 2.2% increase.

**TOTAL FUND OUTLOOK**

STRS Ohio investment assets are projected to end fiscal 2019 slightly above the current market value of approximately $77.8 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 market environment we forecast should offset more than $4 billion of net benefit payments (benefits and operating expenses less contributions) anticipated for fiscal 2019, resulting in a modest increase in total investment assets.

The table below illustrates the expected annual market forecast for each asset class for fiscal 2019 relative to the Retirement Board’s policy for expected average annual returns. As detailed in the various sections of this plan, we project a normal return for the total fund based upon market levels at the end of April 2018. The fiscal 2018 return will likely end the current year with a return moderately above the policy return, following a well above-average return in fiscal year 2017. The total fund has earned a positive return in each year following fiscal 2009 and staff expects this to continue in fiscal 2019.

### ANTICIPATED MARKET RETURNS

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Board Policy Expected Average Annual Benchmark Returns</th>
<th>Benchmark Annualized Return Expectation for Fiscal 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity Reserves</td>
<td>2.25%</td>
<td>At to Above Normal</td>
</tr>
<tr>
<td>Fixed Income</td>
<td>3.00%</td>
<td>At to Below Normal</td>
</tr>
<tr>
<td>Domestic Equities</td>
<td>7.35%</td>
<td>At Normal</td>
</tr>
<tr>
<td>International</td>
<td>7.55%</td>
<td>At Normal</td>
</tr>
<tr>
<td>Real Estate</td>
<td>6.00%</td>
<td>At Normal</td>
</tr>
<tr>
<td>Alternative Investments</td>
<td>7.09%</td>
<td>At Normal</td>
</tr>
<tr>
<td><strong>Total Fund</strong></td>
<td><strong>6.84%</strong></td>
<td><strong>At Normal</strong></td>
</tr>
</tbody>
</table>

Based upon market levels at the end of April 2018. Should market levels change significantly by late June 2018, 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 2.7% with inflation approaching the mid-2% range, representing about 5% nominal GDP growth. This will mark the third consecutive year of above-trend growth for the U.S. economy. The baseline forecast for real GDP growth reflects a range of 2.0%–3.5% and carries an 80% probability of occurrence with only a 10% probability for either an upside or downside outcome. While this economic expansion is nearing a relatively long ninth year, we believe it is still progressing through the middle stage of the cycle and will likely become the longest expansion on record.

- Asset prices in most asset classes are not excessively high considering the better fundamental backdrop that has developed over the past few years. The fiscal 2018 total fund return has been marginally above average and resilient to some bouts of volatility that occurred in the second half of fiscal 2018. We expect the total fund return in fiscal 2019 to be near the board’s long-term policy return.

- Investment staff is proposing one change to the ERM matrix on Page 8 this year. As we forecast another year of cyclical improvement for fiscal 2019 and observe above-trend economic growth globally, we see some diminishing signs of “global financial stress related to low economic growth.” There will continue to be some challenges from long-term demographic and productivity trends that have generated below average economic results during this cycle compared to previous expansions, but we feel the probability for this theme should move from high to medium on the matrix for fiscal 2019.

- The board’s investment consultant, Callan, worked in coordination with staff and the board to complete a comprehensive asset-liability study in fiscal 2017. A key theme for fiscal 2018 was the initial implementation of the phase-in to the new target weights. This phase-in will be completed at the end of fiscal year 2019. The new target asset mix should improve diversification and total fund liquidity, increasing the flexibility to manage the assets to address the challenging cash flow characteristics of the fund.

- Two new associates were added to our alternative investment team in the latter part of fiscal 2018 to further build out our internal capabilities in the asset class. Staff is adding a new co-investment and direct investment theme in the opportunistic/diversified section of this plan that will begin to be funded in fiscal 2019.

- We will continue to monitor closely 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 2019 to discuss relative performance, which reflects strong results and a notable improvement over the past two fiscal years. We also expect to continue to evaluate and potentially implement some new strategies in fiscal 2019, beginning with a new factor-based index strategy discussed with the board on two occasions during fiscal 2018.

- Investment staff from all asset classes will continue to conduct ongoing research on various new potential strategies and methods of implementation discussed with the board during the Annual Investment Seminar in March 2018. This is consistent with the strategic goal initiatives approved by the board in April 2017 and updated in fiscal 2018.

- As the board completes the process to discuss and develop a health care fund management policy during the first half of fiscal 2019, staff will prepare for the necessary discussions in the event a change in the asset mix is determined to be appropriate for the health care fund.
### 3. Asset Allocation/Risk/ERM Matrix

<table>
<thead>
<tr>
<th></th>
<th>July 1, 2018 Neutral Weight</th>
<th>Preliminary April 30, 2018 Weight</th>
<th>General Strategy for Fiscal 2019*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity Reserves</td>
<td>1%</td>
<td>1.5%</td>
<td>The Federal Reserve steadily increased the federal funds rate in fiscal 2018 and we expect a similar policy approach during fiscal 2019 as the economy nears full employment and inflation moves above the Fed’s target. As a result, staff expects to earn a return at-to-above the policy return of 2.25% for the first time since the global financial crisis began. Liquidity reserves will continue to help facilitate the phase-in to new target weights, which requires large allocation flows between our asset classes.</td>
</tr>
<tr>
<td>Fixed Income</td>
<td>21%</td>
<td>19.7%</td>
<td>Staff expects moderately rising interest rates again in fiscal 2019, generating returns at-to-below the policy return of 3%. Large allocations were made to fixed income in fiscal 2018, especially the new liquid treasury portfolio. This accomplished the goals of the asset allocation phase-in and also reduced a large underweight for the asset class as interest rates continued to normalize from historically low levels. We begin fiscal 2019 with an underweight to the overall asset class, but may look to close the gap further if interest rates rise as we expect.</td>
</tr>
<tr>
<td>Equities</td>
<td></td>
<td></td>
<td>Our projection is for a continuation of solid earnings growth that is slightly below consensus estimates in both asset classes, contributing to a good fundamental backdrop. Valuations are reasonable, but certainly not cheap. We expect both asset classes to generate results in line with policy returns. The target weightings for both areas were reduced by two percentage points in fiscal 2018, with one more reduction remaining for each asset class in fiscal 2019. We begin with a slight overweight to total global public equities, but our strategy may be adjusted as our outlook, valuations and asset mix evolve during the year.</td>
</tr>
<tr>
<td>Domestic</td>
<td>29%</td>
<td>28.7%</td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>24%</td>
<td>24.8%</td>
<td></td>
</tr>
<tr>
<td>Total Equities</td>
<td>53%</td>
<td>53.5%</td>
<td></td>
</tr>
<tr>
<td>Real Estate</td>
<td>10%</td>
<td>10.0%</td>
<td>The real estate asset class is projected to have normal returns in line with its long-term policy return of 6%. Real estate fundamentals are reasonably stable for most property types and overall price appreciation should continue to moderate as the real estate cycle matures. We begin with a neutral allocation, but expect some planned disposition activity to move the asset class to a moderate underweight position during fiscal 2019.</td>
</tr>
<tr>
<td>Alternative Investments</td>
<td></td>
<td></td>
<td>We project returns for the alternative asset class to be near the long-term policy returns. Alternative investments begins fiscal 2019 slightly above the asset class target weight of 15%. We will continue making significant new commitments in both areas to maintain this relative positioning, especially as the target weight increases to 10% for O/D and 17% for the asset class by July 1, 2019.</td>
</tr>
<tr>
<td>Private Equity</td>
<td>7%</td>
<td>7.2%</td>
<td></td>
</tr>
<tr>
<td>Opportunistic/Diversified</td>
<td></td>
<td>8%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Total Alternatives</td>
<td>15%</td>
<td>15.3%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

*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 to 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.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Expected Return</th>
<th>Capital Market Risk</th>
<th>Target Allocation**</th>
<th>Rebalancing Range</th>
<th>Approximate April 30, 2018 Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Equities</td>
<td>7.35%</td>
<td>18.70%</td>
<td>28%</td>
<td>23%–33%</td>
<td>28.7%</td>
</tr>
<tr>
<td>International Equities</td>
<td>7.55%</td>
<td>21.30%</td>
<td>23%</td>
<td>18%–29%</td>
<td>24.8%</td>
</tr>
<tr>
<td>Fixed Income</td>
<td>3.00%</td>
<td>3.75%</td>
<td>21%</td>
<td>13%–28%</td>
<td>19.7%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>6.00%</td>
<td>16.45%</td>
<td>10%</td>
<td>6%–13%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>8.15%</td>
<td>32.80%</td>
<td>7%</td>
<td>4%–9%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Opportunistic/Diversified</td>
<td>6.35%</td>
<td>12.34%</td>
<td>10%</td>
<td>3%–12%</td>
<td>8.1%</td>
</tr>
<tr>
<td>Liquidity Reserves</td>
<td>2.25%</td>
<td>0.90%</td>
<td>1%</td>
<td>0%–5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Total Fund</td>
<td><strong>6.84%</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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 −20% to 41%.
- 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 $12.5 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 53 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 1.06% (two times 0.53%) of this return 95% of the time (i.e., between 6.94% and 9.06%). Similarly, in a year when the benchmark return is −3%, the STRS Ohio return is expected to be between −4.06% and −1.94%.

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 April 30, 2018, and the fiscal 2019 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 2019. 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.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>April 30, 2018 Active Management Risk (basis points)</th>
<th>Expected Fiscal 2019 Operating Range (basis points)</th>
<th>Policy Range (basis points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity Reserves</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Core Fixed Income</td>
<td>29</td>
<td>10–90</td>
<td>10–150</td>
</tr>
<tr>
<td>Domestic Equities</td>
<td>76</td>
<td>50–120</td>
<td>20–150</td>
</tr>
<tr>
<td>International Equities</td>
<td>82</td>
<td>70–125</td>
<td>60–250</td>
</tr>
<tr>
<td>Real Estate</td>
<td>350</td>
<td>350*</td>
<td>200–700</td>
</tr>
<tr>
<td>Alternative Investments</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Tactical Asset Allocation</td>
<td>19</td>
<td>10–60</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total Fund</strong></td>
<td><strong>53</strong></td>
<td><strong>40–100</strong></td>
<td><strong>20–160</strong></td>
</tr>
</tbody>
</table>

*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 **

- **Domestic Equities**: 20%
- **International Equities**: 14%
- **Real Estate**: 45%
- **Fixed Income**: 2%
- **Tactical Asset Allocation**: 18%
- **Liquidity Reserves**: 0%
- **Opportunistic/Diversified**: 0%
- **Private Equity**: 0%

** IMPACT AND PROBABILITY ANALYSIS FOR INVESTMENTS **

<table>
<thead>
<tr>
<th>FINANCIAL IMPACT</th>
<th>HIGH</th>
<th>MEDIUM</th>
<th>LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIGH</strong></td>
<td>• Not Earning the Actuarial Assumed Rate of Return Over the 10-year Period</td>
<td>• Long-Term Sovereign Deficit and Debt Issues</td>
<td>• Diversification Ineffective</td>
</tr>
</tbody>
</table>
| **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 |
4. Fiscal 2019 Economic Outlook

U.S. ECONOMIC GROWTH AND INFLATION OUTLOOK

In one year, the current U.S. economic expansion will likely move into uncharted territory. It will be on the cusp of entering its 11th year of economic growth because the risk of recession is low in fiscal 2019. 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.

Though the expansion’s duration is impressive, its performance had been disappointing-to-mediocre because of the long recovery from the financial crisis that led to the Great Recession of 2007–2009. That assessment of its performance changed beginning in early 2016 when real (inflation-adjusted) core economic activity accelerated into the 3% range and overall economic growth returned to its long-term trend. Today, while certainly aged because of the expansion’s length, the U.S. economy is generally behaving like it is in a mid-cycle phase that is pushing gradually closer toward late-cycle characteristics in future years. It will likely leave a duration record that future expansions will find hard to match.

THE LONG EXPANSION CONTINUES WITH SOLID ECONOMIC GROWTH

Upside and downside risks remain to the sturdy U.S. economic forecast for fiscal 2019, but real economic growth in the 2–3.5% range appears to be highly likely. The personal and business tax cuts and reforms that were passed in mid-fiscal 2018 should help to support a third straight year of consumer and business activity in or above the economy’s low-to-mid 2% long-term potential range. If business fixed investment exceeds expectations due to a larger impact from corporate tax reform, full capital expenditures expensing, repatriation of foreign profits that increasingly are used for expansion and further significant federal government deregulations, then U.S. economic growth could surpass the upper bound on the baseline forecast range for real gross domestic product (GDP) growth. A greater acceleration in capital expenditures would also lead in future years to productivity gains that could push potential economic growth above the current long-term range. Meanwhile, the Trump administration’s inability to deliver a unified message on trade policy could damage business and consumer confidence enough that it changes expected behavior and slows economic growth to below the lower bound of the baseline forecast.
range. Furthermore, geopolitical crises in the Middle East and elsewhere remain a threat to U.S. economic growth. Nevertheless, we place a higher probability on solid economic growth in fiscal 2019 than in recent years because the U.S. economy is producing broad-based strength across most economic sectors with new expansionary fiscal policy that should offset the gradual movement toward more restrictive monetary policy.

Real GDP growth through the third quarter of fiscal 2018 has averaged an annualized 2.2% over the entire expansion. That rate of growth remains roughly 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 1.1% during the past nine years compared to a postwar expansion average of 2.4% and an entire post-war 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 post-war 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.

Following weak 0.5% overall and 1.5% core annualized economic growth in the middle quarters of fiscal 2016, the U.S. economy accelerated. Total economic activity has advanced by nearly 2.5% while core economic activity (real private domestic final sales that equals real GDP less volatile foreign trade, inventory change and government spending) has grown an annualized 3% over the subsequent two years. When the final results for fiscal 2018 are tallied, the total U.S. economy likely grew by roughly 2.9% while real private domestic final sales increased by a strong 3.1%. For fiscal 2019, the STRS Ohio economic forecast expects economic activity in the United States will rise by 2.7% while real core economic growth continues at a 3.1% rate.

In the upcoming fiscal year, consumer spending is expected to accelerate further from still-strong, though marginally slower, employment gains and added after-tax income from the recent federal tax changes. Through the first 10 months of fiscal 2018, monthly employment gains averaged 189,000 in an economy whose long-term average monthly increases should fall into the 75,000–100,000 range. As a result, the unemployment rate fell to 3.9% in April from 4.3% at the end of fiscal 2017. Most estimates for the natural rate of unemployment (where inflation pressures are considered to be evenly balanced) rest around 4.5%, so today’s unemployment rate suggests inflation pressures are growing. Furthermore, the underemployment rate (that measures people who would like to work more hours in addition to those who would like a job) fell significantly to 7.8% in April from 8.5% at the start of the fiscal 2018. That tells us that, not only are the unemployed finding jobs, but that workers are more satisfied with the amount of work they are receiving. And, for the first time since 2000 when the data collection started, the number of job openings around the country match the number of total unemployed workers. While it is impossible to completely match up job openings with the remaining unemployed, that shows businesses face an extremely tight labor market.

In fiscal 2019, jobs growth will likely be in a range of 150,000 to 200,000 a month — allowing the unemployment rate to end the fiscal year in the mid-3% range. Corresponding real disposable income growth should move above 3% after a 2.1% increase in fiscal 2018 because of the tight labor market and tax changes. That should then support a moderate acceleration in real consumer spending to about 2.8% in fiscal 2019 from 2.6% in fiscal 2018.

Business investment in structures and equipment collapsed from late 2014 through 2016 largely due to a pullback in the energy sector, as commodity prices descended. Non-residential investment was virtually flat during that period because of the plunge from reduced investment in oil and gas wells. Energy prices began to move higher in mid-2016, providing an incentive for domestic oil and gas producers to return and, again, invest in structures and equipment. Over the five quarters since 2016, business fixed investment has grown a robust 6.25% annualized and orders activity for future investment has remained strong.
A key part of the Republican administration and Congress’ tax policy changes focused on the business sector by significantly lowering the corporate tax rate, providing incentives through a much lower tax rate to bring foreign profits home, allowing immediate expensing of capital equipment purchases and reducing regulations on how businesses operate. Provided that murky trade policy positions from the Trump administration do not cause a collapse in business confidence or a significant wave of counter-protectionist measures from other countries, this friendlier tax policy climate to expand investment and a strong domestic economy should keep non-residential investment growing at a solid rate through fiscal 2019. The STRS Ohio economic forecast expects that important sector of the economy will grow 4.6% after a 5.8% pace in fiscal 2018.

Following the collapse of the housing sector before and during the Great Recession, residential investment has been a consistent contributor to overall economic growth even though its influence on the economy is smaller. At its peak in 2005, real residential investment was 6.2% of real GDP. It fell to as low as 2.5% of real GDP but has now reached about 3.5% of real GDP. That is still well short of its 5.6% average share of real GDP since World War II, but the sector has increasingly become a more important component of economic activity. During the current expansion, residential investment has grown an annualized 5.6% and remains the only economic sector outpacing its average annualized growth rate of all post-war economic expansions. So, while its contribution is smaller because of its smaller size within the economy, residential investment has made important contributions to the economy since the trough of the Great Recession.

Housing starts, which had fallen to an annual rate below 500,000 units at the end of the recession, grew to about 1.27 million units in fiscal 2018 after 1.2 million units in fiscal 2017. Further economic gains from the housing sector should continue through fiscal 2019, as housing affordability for the potential buyer remains relatively high and homebuilders expect solid demand in coming quarters, particularly since the supply of new and existing homes is tight. The STRS Ohio economic forecast expects that real residential investment will grow 3.5% in the upcoming fiscal year while housing starts will total roughly 1.32 million units.

Leading economic indicators suggest that future economic growth in the United States will remain strong after having slowed from fiscal 2014 through part of fiscal 2016. The Economic Cycle Research Institute’s leading index (a measure that is heavily influenced by weekly financial market series) soared
before fiscal 2017 after the stock market began to rebound in mid-February 2016. Its surge continued into January 2017, reaching highs not seen since immediately after the Great Recession, though it slid to virtually no gain in early fiscal 2018. Today’s reading still matches up with solid economic growth. Meanwhile, the Conference Board’s leading index (a measure that is heavily influenced by monthly real economic series) bottomed out just before fiscal 2017 and has been steadily improving since. Other private sector surveys that provide leading economic data remain in moderate-to-strong growth territory, pointing towards further gains for the U.S. economy. Together, these leading indicators support the forecast of a continued strong economy for, at least, fiscal 2019.

Commodity prices bottomed in early-2016, helping to subsequently drive headline inflation measures like the personal consumption expenditures (PCE) price index upward from flat growth in early fiscal 2016. Rising energy costs, particularly in fiscal 2018, have added pressure to headline inflation measures. The PCE price index through March was already growing at the 2% rate that the Federal Reserve considers to be its long-term average target. Over the prior eight months, its growth rate was an even higher 2.6% annualized. Meanwhile, the core PCE price index that excludes volatile food and energy costs was advancing slightly below the 2% target at 1.9% year-over-year through March. It, too, has accelerated in recent months, growing an annualized 2.3% since September.

Inflation pressures are clearly quickening, both broadly and after stripping away volatile segments. Consumer prices over the past year have grown 2.4% while core consumer prices have advanced by 2.1%. Perhaps more alarming, however, is that the Federal Reserve Bank of Cleveland’s median consumer price index (constructed to get an idea of how true inflation is behaving) has grown 2.6% — an expansion high — over the past year. With increasingly little slack remaining in the labor market, wage pressures should add to the inflation outlook and keep actual inflation at the high end of the Federal Reserve’s targeted range.

The total consumer price index is expected in the STRS Ohio economic forecast to grow by 2.4% in fiscal 2019 after advancing 2.9% in fiscal 2018. The core measure of CPI is expected to remain at 2.4% in fiscal 2019. Meanwhile, the PCE price index that the Federal Reserve closely tracks should continue growing by a similar amount in fiscal 2019 compared to fiscal 2018 — 2.3% versus 2.4% — while the broadest measure of economy-wide inflation, the GDP price index, should advance by 2.3% after a 2.1%
gain in the current fiscal year. In each case, inflation measures are expected to remain marginally above the Federal Reserve’s long-term target rate of 2%.

The Federal Reserve has maintained a stimulative 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 1.50–1.75% for the federal funds rate.

Federal Reserve policymakers would like to raise short-term interest rates further in fiscal 2019, but they will continue to closely watch how the U.S. and foreign economies and financial markets react to less stimulative monetary policy within the United States. An intermittent course of gradually raising short-term interest rates is the most likely one from the Federal Reserve. The federal funds targeted rate could end fiscal 2019 in the 2.75–3.00% range.

Furthermore, the Federal Reserve will continue to reduce the assets on its balance sheet in fiscal 2019. Like the interest rate policy it has pursued since the Great Recession, the Federal Reserve will be cautious with a gradualist policy change for its balance sheet so as to not disrupt the financial markets or economy.
from its healthy course. Federal Reserve Chair Jerome Powell has testified in the past to an acceptable range for assets on the central bank’s balance sheet that would, given the reduction course already laid out by policymakers, lead to a partial reversal of QE through 2020 or even into 2021. Relevant ranges for the federal funds rate and 10-year Treasury yield for the upcoming fiscal year are listed in the table below.

<table>
<thead>
<tr>
<th>Period</th>
<th>Federal Funds Rate</th>
<th>10-Year Treasury Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal 2019 Ranges</td>
<td>1.75%–3.00%</td>
<td>2.50%–4.00%</td>
</tr>
</tbody>
</table>

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

The baseline economic forecast during fiscal 2019 of above long-term economic growth with moderately stronger inflation pressures carries an 80% chance of occurring. Downside risks to that forecast where economic activity would fall below 2% (i.e., being in recession or feeling much like a recession) and upside risks where economic activity would rise above 3.5% each carry about a 10% chance of happening. The Blue Chip Economic Indicators consensus forecast for real GDP growth during fiscal 2019 is 2.7% — the same as the STRS Ohio economic forecast. The consensus forecast for the GDP price index is 2.2% versus our 2.3%. Consumer prices, however, are expected to grow by 2.4% in the STRS Ohio forecast, while the consensus view calls for a smaller 2.2% increase. The combination of real economic growth and inflation generates our nominal GDP forecast of 5% versus the consensus estimate of 4.9%.
# U.S. Economic Forecast Summary

<table>
<thead>
<tr>
<th>Composition of Real GDP</th>
<th>Fiscal Year Ranges</th>
<th>FY 2019</th>
<th>FY 2019 H1</th>
<th>FY 2019 H2</th>
<th>FY 2018</th>
<th>FY 2018 H1</th>
<th>FY 2018 H2</th>
<th>FY 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product</td>
<td>2%–3.5%</td>
<td>2.7%</td>
<td>2.9%</td>
<td>2.5%</td>
<td>2.9%</td>
<td>3.0%</td>
<td>2.8%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Personal Consumption</td>
<td>2%–3.5%</td>
<td>2.8%</td>
<td>2.9%</td>
<td>2.7%</td>
<td>2.6%</td>
<td>3.1%</td>
<td>2.0%</td>
<td>2.7%</td>
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<tr>
<td>Nonresidential Investment</td>
<td>0%–10%</td>
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<td>5.3%</td>
<td>4.0%</td>
<td>5.8%</td>
<td>5.7%</td>
<td>5.8%</td>
<td>4.3%</td>
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<tr>
<td>Residential Investment</td>
<td></td>
<td>3.5%</td>
<td>3.9%</td>
<td>3.1%</td>
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<td>1.3%</td>
</tr>
<tr>
<td>Exports of Goods &amp; Services</td>
<td></td>
<td>3.2%</td>
<td>3.2%</td>
<td>3.1%</td>
<td>4.7%</td>
<td>4.5%</td>
<td>4.8%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Imports of Goods &amp; Services</td>
<td></td>
<td>3.9%</td>
<td>4.0%</td>
<td>3.9%</td>
<td>4.5%</td>
<td>6.7%</td>
<td>2.6%</td>
<td>4.1%</td>
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<tr>
<td>Federal Consumption &amp; Investment</td>
<td></td>
<td>2.2%</td>
<td>2.0%</td>
<td>2.4%</td>
<td>1.9%</td>
<td>2.3%</td>
<td>1.5%</td>
<td>0.1%</td>
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<tr>
<td>State &amp; Local Consumption &amp; Investment</td>
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<td>0.8%</td>
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<td>0.7%</td>
<td>(0.2%)</td>
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<td>Final Sales</td>
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<td>2.9%</td>
<td>2.5%</td>
<td>2.7%</td>
<td>2.9%</td>
<td>2.6%</td>
<td>2.2%</td>
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<tr>
<td>Domestic Final Sales</td>
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<td>2.8%</td>
<td>3.0%</td>
<td>2.7%</td>
<td>2.8%</td>
<td>3.2%</td>
<td>2.3%</td>
<td>2.4%</td>
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<tr>
<td>Private Domestic Final Sales</td>
<td></td>
<td>3.1%</td>
<td>3.3%</td>
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<td>3.1%</td>
<td>3.5%</td>
<td>2.6%</td>
<td>2.9%</td>
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<td><strong>Incomes</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Real Disposable Personal Income</td>
<td></td>
<td>3.1%</td>
<td>3.1%</td>
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<td>2.1%</td>
<td>0.9%</td>
<td>3.3%</td>
<td>1.1%</td>
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<tr>
<td>Nominal GDP Corporate Profits, After Tax</td>
<td>0–10%</td>
<td>6.8%</td>
<td>13.8%</td>
<td>0.5%</td>
<td>6.1%</td>
<td>15.9%</td>
<td>(2.3%)</td>
<td>7.8%</td>
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<td><strong>Prices</strong></td>
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<tr>
<td>Consumer Price Index</td>
<td></td>
<td>2.4%</td>
<td>2.5%</td>
<td>2.4%</td>
<td>2.9%</td>
<td>2.7%</td>
<td>3.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Consumer Price Index Ex Food &amp; Energy</td>
<td>1.5%–3%</td>
<td>2.4%</td>
<td>2.5%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>2.0%</td>
<td>2.9%</td>
<td>1.8%</td>
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<td>Personal Consumption Expenditures Price Index</td>
<td></td>
<td>2.3%</td>
<td>2.4%</td>
<td>2.3%</td>
<td>2.4%</td>
<td>2.1%</td>
<td>2.6%</td>
<td>1.6%</td>
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<tr>
<td>GDP Price Index</td>
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<td>2.3%</td>
<td>2.3%</td>
<td>2.4%</td>
<td>2.1%</td>
<td>2.2%</td>
<td>2.0%</td>
<td>1.6%</td>
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<tr>
<td><strong>Other Key Measures</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Real Net Exports (SB)</td>
<td>($695)–($635)</td>
<td>($664.6)</td>
<td>($654.0)</td>
<td>($675.3)</td>
<td>($633.9)</td>
<td>($625.7)</td>
<td>($642.1)</td>
<td>($606.1)</td>
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<tr>
<td>Real Change in Business Inventories (SB)</td>
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<td>$38.1</td>
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<td>$34.1</td>
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<td>Light Vehicle Sales (M)</td>
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<td>16.81</td>
<td>16.88</td>
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<tr>
<td>New Housing Starts (M)</td>
<td>1.2–1.4</td>
<td>1.316</td>
<td>1.328</td>
<td>1.305</td>
<td>1.268</td>
<td>1.214</td>
<td>1.321</td>
<td>1.201</td>
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<tr>
<td>Industrial Production</td>
<td></td>
<td>2.9%</td>
<td>3.0%</td>
<td>2.7%</td>
<td>3.5%</td>
<td>3.1%</td>
<td>3.9%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td></td>
<td>3.8%</td>
<td>3.9%</td>
<td>3.7%</td>
<td>4.1%</td>
<td>4.2%</td>
<td>4.1%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>
INTERNATIONAL ECONOMIC GROWTH AND INFLATION OUTLOOK

Real economic growth of developed countries should outpace their trend growth rates for the second consecutive year. As their expanding employment rates fortify domestic demand, inflation should inch up toward their central banks’ policy targets in a sustained way. Consequently, major central banks may either lift their policy interest rates marginally or signal further reductions of expansionary monetary policies such as quantitative easing (QE) programs. Despite that change, real interest rates will still be negative and boost economic activity through fiscal 2019.

POLICY INTEREST RATES IN DEVELOPED COUNTRIES TO STAY LOW AS MONETARY POLICY EVOLVES

In catching up to its full potential output and employment, the eurozone’s real gross domestic product (GDP) should grow faster than its trend rate because economic recovery has spread to nearly all member nations. As unemployment drops further from 8.5% to about 6.5% in the next 12–18 months, firms are likely to sustain price hikes and inflation should creep toward the European Central Bank’s (ECB) 2% policy goal with a better chance of staying near the target than in past years. This prospect should allow the ECB to taper or end its 30 billion euro monthly QE in September 2018 and then pause before signaling future policy rate hikes. The risk is that in response to the solidifying economic activity the euro may appreciate too rapidly, subduing inflation expectations and delaying the policy change.

HEALTHY INFLATION TO GAIN TRACTION IN THE EUROZONE

In catching up to its full potential output and employment, the eurozone’s real gross domestic product (GDP) should grow faster than its trend rate because economic recovery has spread to nearly all member nations. As unemployment drops further from 8.5% to about 6.5% in the next 12–18 months, firms are likely to sustain price hikes and inflation should creep toward the European Central Bank’s (ECB) 2% policy goal with a better chance of staying near the target than in past years. This prospect should allow the ECB to taper or end its 30 billion euro monthly QE in September 2018 and then pause before signaling future policy rate hikes. The risk is that in response to the solidifying economic activity the euro may appreciate too rapidly, subduing inflation expectations and delaying the policy change.
Meanwhile, the Bank of England (BoE) has hesitated to lift its 0.5% policy rate as transient economic sluggishness was adding to the uncertainty investors already felt about the nature of the United Kingdom’s exit from the European Union (Brexit) in 2019. Though inflation has exceeded the 2% policy target rate for about two years due to the effects of a depreciated exchange rate, it too has predictably returned toward the target after those effects have waned — justifying the BoE’s cautious policy stance. Despite the dampening effects of the Brexit issue, negative real interest rates and low unemployment should continue to boost domestic demand while solid foreign demand supports exports. That may allow the BoE to raise the policy rate from 0.5% to 1% in two 0.25% increments over fiscal 2019. However, policymakers will continually express caution about any emergent risks and will likely pause to study how the economy responds after each rate increase.

Due to anemic inflation in Japan, the monetary policy of maintaining a zero interest rate along with doses of QE to keep long-term rates near zero will remain until inflation climbs securely above 2% for an extended period. Though that will take longer than fiscal 2019 to achieve, tight labor markets, capital spending and cyclical strength of the global economy should help real GDP growth outpace the 0.5% long-term trend rate.

Overall, developed countries should continue to grow at a solid pace, providing a healthy backdrop for economic growth in emerging countries. While major central banks like the ECB and the BoE, among others, may incrementally shift gears, they are likely to orchestrate the change very gradually. Despite those incremental steps, monetary conditions should stay expansionary and foster global economic growth.

China’s real GDP growth, for instance, should stay slightly above the upper end of the long-term 5.5–6.5% range. As policymakers have been able to cull debt-related risks without disrupting economic growth, the yuan has appreciated against major currencies — leading to cuts in the reserve requirement ratios to counter the exchange rate’s near-term effects on the economy. With inflation contained, the reserve requirement ratio is likely to be cut further in fiscal 2019 to offset the effects of an appreciated exchange rate, to help liberalize the determination of interest rates and to discourage savings so that demand stays robust. The resulting steadiness of economic growth should elevate the prospects of developed countries such as Australia and Canada as well as those of South Korea, among other emerging countries, that trade heavily with China.

India is expected to post another year of strong economic growth as streamlining of a long-fractured tax system should continue to generate trans-provincial investments in infrastructure, production and distribution facilities. Meanwhile, inflation has been within the target policy range, ensuring that policy interest rates stay range-bound as well. As inflation expectations stay contained, real income growth and subdued real interest rates should boost interest rate-sensitive economic activity, enabling India to post the fastest real GDP growth among emerging countries — a feature likely to recur in future years.

In Latin America, despite Brazil’s political woes, decisive economic gains may occur due to improving global demand, higher commodity prices and better terms of trade. However, monetary policy will continue to face the dilemma of inflation speeding up due to global pressures even as the domestic economy is sluggish. By contrast, Mexico’s outlook is more upbeat due to solid economic growth in the United States. However, potential for political change in the general election could lead the peso to depreciate and force the central bank to become more cautious as the peso’s depreciation lifts inflation expectations. Meanwhile, stronger growth in emerging countries, firm global commodity prices and solid demand from the United States should allow Canada to advance at a healthy pace as its monetary policy shadows that of the Federal Reserve and the Bank of Canada hikes its policy interest rate by at least 0.5%.

As the U.S. Federal Reserve raises policy interest rates further and the ECB signals change of policy direction, the likely appreciations of the U.S. dollar and the euro against other currencies may raise the risks in countries where businesses had borrowed in dollars and euros. Emerging countries such as Argentina and Turkey where a legacy of excessive borrowing and fiscal deficits has now led to high inflation rates are likely to stay vulnerable should investors lose confidence in their policymakers’ abilities
to address the issue in a timely manner. However, in contrast to those smaller emerging countries, major ones such as Brazil, Russia, India and China carry healthier domestic fundamentals amid a supportive global economic environment.

In sum, economic growth is likely to stay robust in both developed and emerging countries. Most developed countries are expected to reach ever closer to their full-potential growth rates over the next 12 to 18 months. Consequently, inflation, too, should steadily climb toward the policy targets rates — requiring increasingly less monetary policy support than before. Acknowledging that underlying progress, most developed countries’ central banks should prepare investors for the prospect of change in monetary policies. But, that change is likely to be implemented very gradually so that it does not undermine hard-won economic gains achieved over the past few years. Meanwhile, central banks of emerging countries are likely to juggle their own country-specific domestic priorities with the effects of changing monetary policies in developed countries, especially with how financial markets respond to those changes.

<table>
<thead>
<tr>
<th>INTERNATIONAL FORECASTS</th>
<th>Real Gross Domestic Product</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country/Region</strong></td>
<td><strong>FY 2019</strong></td>
<td><strong>FY 2018</strong></td>
</tr>
<tr>
<td>Canada</td>
<td>2.6%</td>
<td>2.5%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.9%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Eurozone</td>
<td>2.6%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Germany</td>
<td>2.4%</td>
<td>2.5%</td>
</tr>
<tr>
<td>France</td>
<td>2.6%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Italy</td>
<td>1.6%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Asia–Pacific</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>1.7%</td>
<td>1.0%</td>
</tr>
<tr>
<td>China</td>
<td>6.6%</td>
<td>6.7%</td>
</tr>
<tr>
<td>India</td>
<td>7.5%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Australia</td>
<td>3.0%</td>
<td>2.5%</td>
</tr>
<tr>
<td>South Korea</td>
<td>2.9%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Latin America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>2.6%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Mexico</td>
<td>2.7%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
5. Fixed Income Investments

**TREASURY YIELD CURVE**

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**OUTLOOK**

**Bond Market Returns**

We forecast the total return of the fixed income market to be at-to-below the STRS Ohio Policy return of 3.00% in fiscal year 2019. The fixed income benchmark yield begins the fiscal year above the policy return at 3.61%. Since we forecast prices in the benchmark to decline, we expect the benchmark to finish fiscal year 2019 with a low total return.

**Federal Reserve**

The Federal Reserve is gradually reducing monetary policy accommodation. The federal funds rate was increased by 75 basis points fiscal year-to-date through April, consistent with an improving domestic economy and economic outlook. We expect the Federal Reserve to increase the federal funds rate on two to four occasions before the end of fiscal year 2019. Our fiscal year 2019 forecasted range for the federal funds rate is 1.75%–3.00%. This higher level of short-term interest rates reflects sustainable economic growth expectations.

As a result of quantitative easing, the Federal Reserve maintained a large balance sheet relative to GDP. However, consistent with reducing accommodation, the Federal Reserve began in October 2017 to programmatically cap reinvestments, shrinking the balance sheet gradually. The quantitative tightening (QT) process was well communicated and will likely have little impact on the economy. However it may cause interest rates to rise marginally.

We expect a gradual approach to monetary policy normalization to include both rate increases and balance sheet reductions. However, a stronger than expected domestic economy or an increase in inflation may cause the Federal Reserve to increase the pace of rate hikes. Conversely, a weaker than expected economy combined with discouraging global economic events may cause a delay in the expected policy normalization.
**Market Interest Rates**

The expected interest rate range for the 10-year Treasury yield is based on the STRS Ohio economic forecast of moderately above trend real growth, inflation remaining above the Federal Reserve’s target of 2.00% and increases in the federal funds rate. Our forecasted 10-year Treasury interest rate range is 2.50%–4.00%, with a baseline expectation of a rise from the current yield level of 2.94% to the upper half of the range.

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 5.00% versus the current 10-year U.S. Treasury yield of 2.94%, a rich valuation relative to economic fundamentals. Sustained economic growth and stimulative fiscal policy support growth and inflation expectations throughout the fiscal year. The U.S. Treasury is expected to issue more than twice the amount of securities as the previous year to finance the larger budget deficit resulting from the recently implemented fiscal stimulus. This additional issuance is likely to put upward pressure on long-term rates coinciding with the Federal Reserve and other central banks reducing policy accommodation.

The factors that support the lower end of the interest rate range include the potential for a delay in federal funds rate increases, better than expected budget deficit, lower than expected growth or inflation and low term premium. The Federal Reserve may delay raising the federal funds rate, or do so at a slower pace than expected, if growth and inflation are weaker than our expectations. However, one or more increases in the federal funds rate would make it difficult for the 10-year Treasury yield to trade below 2.50% absent a higher probability of recession.

Long-term interest rates at the high end of our forecasted range would remain low relative to nominal growth. Given our economic forecast and expected Federal Reserve actions, short-term rates will likely increase more than long-term rates.

**Credit Quality**

Credit cycle indicators are benign and suggest a stable corporate credit environment. Recently enacted fiscal stimulus will support credit quality, further extending the credit cycle.

Corporate revenue and profits are experiencing solid growth, profit margins are strong, and leverage is stabilizing at a high level. Corporate tax reform will increase companies’ profits and cash flow through a lower corporate tax rate and overseas cash repatriation. We expect companies 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 higher net interest margins, lower litigation expenses, higher capital markets revenue, and a lower corporate tax rate.

High yield credit quality is stable, aided by a strong economy and corporate tax reform. Default rates are expected to remain low in the 2%–3% range in fiscal 2019. 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 is supported by solid economic growth in both emerging and advanced economies. Chinese growth has stabilized and higher commodity prices are helping commodity producing countries in emerging markets. However, escalating trade restrictions and retaliatory actions could trigger trade wars that harm export-oriented emerging market countries. In addition, the Federal Reserve may tighten monetary policy faster than expected, as the U.S. economy grows above potential, aided by late cycle fiscal stimulus resulting in higher interest rates and a stronger U.S. dollar. The stronger U.S. dollar may destabilize some emerging market countries and trigger capital outflows.
Overview

The Core Fixed Income Portfolio will begin fiscal year 2019 with an active management risk of 29 basis points 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 2019.

- The STRS Ohio economic forecast predicts an environment that will provide the Federal Reserve the conditions to reduce monetary policy accommodation throughout the fiscal year. As a result, we expect interest rates will rise and the yield curve will flatten gradually throughout the fiscal year.

- Globally, accommodative central bank policies have led to supply and demand dynamics that support low interest rates. However, as pockets of the global economy improve, discussions pertaining to normalization are occurring. Global monetary policy may approach a synchronous reduction in accommodation near the end of the fiscal year. This will add upward pressure on interest rates.

- The fixed income neutral target allocation was increased from 18.0% at the beginning of fiscal 2018 to the current 21.0%. This resulted in investing $2.1 billion in the asset class as the increase in interest rates led to better valuations.

- Total fund liquidity has improved with the addition of the Liquid Treasury Portfolio. The total fund is in better position to respond to market volatility and pay benefits without disrupting the core bond portfolio.

- Overall, the fixed income portfolio is positioned for our forecast and well positioned for risk-off events.

- We have positioned the core portfolio with a relative duration of 94.0%. Our strategy reflects the STRS Ohio economic outlook, rich valuation of interest rates relative to economic fundamentals and a less accommodative monetary policy leading to a rise in interest rates.

- Regarding sector allocation of the Core portfolio, we reduced the overweight in U.S. Treasuries, while adding to agency mortgage-backed securities, U.S. agency debentures, investment grade corporates and high yield sectors.

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. During the fiscal year we tactically increased our non-index Treasury Inflation Protected Securities (TIPS) position given our short-term view on inflation increasing to 2% or above.

- The new allocation to the Liquid Treasury Portfolio increased the overall liquidity of the total fund.

- The Core Fixed Income Portfolio will continue to review less liquid sectors and opportunistically provide liquidity in risk-off markets, earning a liquidity premium.

Sectors

Treasuries

- During fiscal year 2018, we moved Treasuries from a large overweight to a modest overweight as we added to spread sectors that offered better relative value.

- We have a tactical position in TIPS as inflation break-evens are below our inflation expectations.
• The Liquid Treasury Portfolio (LTP) consisting of high quality, liquid securities was funded during the previous fiscal year and has a market value of $3.1 billion, representing 4.0% of total fund assets.
  – The LTP neutral target allocation steps up 1% to 5% of total fund assets on Oct. 1, 2018. Correspondingly, the asset allocation weight to core fixed income decreases by 1% on the same date.
  – 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 have selectively added government related securities during the fiscal year, but still 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 generally flat to declining. 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 and fiscal stimulus. 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.
  – This will cause a modest amount of spread widening since the Fed is currently the largest and most consistent buyer within this market.
  – As relative value increases with spread widening, we anticipate increasing our weight.

**Investment Grade Corporates**

• We begin fiscal 2019 slightly overweight investment grade corporates. Yield spreads are near post-crisis tight levels 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 2019 if yield spreads remain tight.

**Emerging Market Debt**

• We begin the fiscal year underweight emerging market debt. Yield spreads are low and have the potential to widen if interest rates rise and the U.S. dollar strengthens in the fiscal year.
• We remain cautious on emerging market debt but will look for opportunities to increase our weight if yield spreads widen during fiscal year 2019.
## BOND STRUCTURE REPORT
(as of April 2018)

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Market Value* ($ millions)</th>
<th>% of Asset Class</th>
<th>Portfolio Annualized Tracking Risk¹</th>
<th>Portfolio Duration²</th>
<th>Relative to Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Fixed Income</td>
<td>$12,247</td>
<td>80%</td>
<td>29 bps</td>
<td>5.53 yrs</td>
<td>94.0%</td>
</tr>
<tr>
<td>Liquid Treasury Portfolio</td>
<td>$ 3,103</td>
<td>20%</td>
<td>1 bps</td>
<td>3.83 yrs</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total Fixed Income</td>
<td>$15,350</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Core Fixed Income             |                            |                  |                                    |                     |                  |
| Treasuries                    | $ 3,581                    | 29%              | 2.8%                               | 1.11x               |
| Government Related⁴           | $  314                     | 3%               | 2.7%                               | 0.31x               |
| Mortgages⁵                    | $  2,091                   | 17%              | 3.4%                               | 0.70x               |
| CMBS & ABS⁶                   | $   774                    | 6%               | 2.8%                               | 1.08x               |
| Investment Grade Corporates⁷  | $  3,800                   | 31%              | 3.6%                               | 1.05x               |
| High Yield Corporates⁸        | $   878                    | 7%               | 6.1%                               | 1.34x               |
| Emerging Market Debt⁹         | $   810                    | 7%               | 6.4%                               | 0.81x               |
| **Total Core Fixed Income**   | **$12,247**                | **100%**         | **3.6%**                           |                     |

| Liquid Treasury Portfolio     |                            |                  |                                    |                     |                  |
| Treasuries                    | $  3,103                   | 100%             | 2.7%                               |                     |
| **Total Liquid Treasury**     | **$  3,103**               | **100%**         | **2.7%**                           |                     |

*Market Values for April 30, 2018, 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 29 basis points, meaning the performance of the portfolio relative to the index is expected to be within 29 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 5.53 years implies the average price of the portfolio is expected to rise by 5.53% for a 1% (100 basis point) decline in interest rates and is expected to fall by 5.53% for a 1% (100 basis point) increase in interest rates. The portfolio duration relative to the index, currently at 94.0%, 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 2019 we forecast total returns to be in a range of 6–13%, essentially at the STRS Ohio policy return of 7.35%. Key factors behind this forecast are:

- Strong earnings growth
  - Lower tax rates should continue to boost 1H earnings.
  - Repatriated cash will be deployed to enhance earnings either through share repurchases, merger and acquisition (M&A) activity or funding growth initiatives.
  - Moderate economic growth should continue to be supportive.
  - Positive trends on earnings will be partially restrained by an already high level of profit margins.
- Price to earnings (P/E) multiples that are likely to be flat to down.
  - Although off their peaks, P/E multiples are still near the upper end of the normal trading range.
  - The Federal Reserve is expected to raise the federal funds rate several times during the fiscal year, which could lead to lower valuations.
  - Geopolitical uncertainty and the potential for trade wars will remain major risks for the market.
  - The return of volatility should hold valuations down.

Summary of 2018

The U.S. equity market has had a strong fiscal year 2018 due to extremely good earnings growth boosted by tax reform. Standard & Poor’s (S&P) 500 earnings are set to rise a little over 20% for the fiscal year. U.S. and global economies grew at a solid pace and were supportive of the equity markets. Rising interest rates have not yet begun to bite into the economy or earnings, although they may be constraining equity valuation ratios.

The market has been led by a surging technology sector, which is up more than 20% for the fiscal year through April. The energy sector has also performed well, rising 16%. Growth has outperformed value by a significant margin throughout the year and small cap stocks have slightly beaten large caps. The market has moved toward more of a risk-off mode although pure defensive sectors such as staples, telecommunications, and utilities have continued to perform poorly. Volatility has increased significantly since January and investors appear to be nervous that the current economic cycle is in the late stages. While this has been a long cycle and we are getting closer to the late stages, a recession does not appear to be imminent. Fiscal year total returns for the S&P 500 through the end of April are +11.0%, above the long-term policy expectation for domestic equities of 7.35% and slightly exceeding expectations from last year’s annual plan. At April 30, 2018, the S&P 500 stands at 2648.05, up from the beginning of the fiscal year level of 2423.40.
Economic Drivers

Economic conditions should remain supportive of equities in fiscal year 2019. The STRS Ohio Economics Department anticipates a modest deceleration in the U.S. economy into fiscal 2019 with real GDP growth expected to rise a still healthy 2.7%. Moderate to strong GDP growth with only slightly accelerating inflation will continue to allow earnings to grow at a healthy pace. In addition, interest rates rising at only a gradual pace should not significantly dampen equity market valuations. Similarly, continued solid growth in international economies should also benefit equity markets.

<table>
<thead>
<tr>
<th>S&amp;P Operating EPS</th>
<th>FY 2017</th>
<th>FY 2018 (est.)</th>
<th>FY 2019 (est.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRS Ohio Forecast</td>
<td>$116</td>
<td>$140</td>
<td>$160</td>
</tr>
<tr>
<td>EPS Growth (YoY)</td>
<td>+18.1%</td>
<td>+20.7%</td>
<td>+14.3%</td>
</tr>
<tr>
<td>Consensus Forecast</td>
<td>$116</td>
<td>$141</td>
<td>$165</td>
</tr>
<tr>
<td>EPS Growth (YoY)</td>
<td>+18.1%</td>
<td>+21.4%</td>
<td>+17.4%</td>
</tr>
</tbody>
</table>
Earnings

For fiscal year 2019, earnings per share for the S&P 500 is expected to grow at a healthy clip, increasing a little over 14% to $160. Tax reform is benefitting earnings growth in three ways. First, lower tax rates are an immediate boost to the bottom line, which should lead to high earnings growth in the first half of Fiscal 2019. Second, lower taxes on repatriated earnings are allowing companies to more efficiently adjust their capital structures and reinvest either by repurchasing shares or embarking on M&A activities. Lastly, any acceleration in consumer spending from lower personal tax rates should directly benefit consumer-oriented companies.

The technology, energy, and financial sectors will continue to see strong earnings gains. The technology sector is benefitting from strong industrial and consumer demand and pricing for chip companies should remain strong into next year. The energy sector continues to improve with both oil prices and drilling activity continuing to rise. West Texas Intermediate (WTI) crude has climbed to $71, up from $46 at the beginning of the fiscal year. In addition, energy companies continue to add oil rigs at a strong pace — particularly shale producers in the Permian basin. Financial sector earnings are likely to be buoyed by further interest rate hikes from the Federal Reserve and the recent roll back in financial regulation under the new administration. Outside of these sectors, S&P 500 earnings growth will be more muted. Offsetting these tailwinds is the high level of margins currently enjoyed by U.S. companies (see chart on following page) with little room for upside. Wage pressures are starting to mount and freight costs are soaring, which could eat into those healthy margins. Rising interest rates could also pressure net margins further on higher interest costs.

Source: Standard and Poor's
Note: Shaded areas denote recession.
Additionally, in the wake of tax reform, we expect companies to use repatriated cash to buy back shares at record levels to drive earnings per share growth. Merger and acquisition activity should also reaccelerate in fiscal year 2019 as tax reform has also made M&A more attractive to U.S. corporates, and the current administration may be more accommodating toward M&A — approving deals that might have been blocked previously. Capital expenditures should also increase, although we expect it to be a more modest improvement as capacity utilization is still low.

**Valuations**

The S&P 500 is currently trading at 18.9 times trailing 12-month earnings. Although down from the peak this cycle above 20 times, it is still well above the historical average of 14–15 times earnings. With the economy closer to the later phase of the cycle, we believe that P/E ratios may have peaked for this cycle. 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 interest rates rising faster than anticipated, geopolitical instability, a trade war, or a rising external threat such as terrorism. Factors that could drive valuations higher are a reaccelerating economy that mitigates investor fears of an ending 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 2800–3000. This estimate is based on a P/E multiple expectation of 17.5–19 times $160 in estimated earnings. Under alternative scenarios, an accelerating U.S. economy with benign inflation could drive earnings to near $175 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 $120 or below — resulting in the S&P 500 at 2200 or lower. The following table illustrates our forecast (all estimates are approximate and may be rounded for simplicity).

<table>
<thead>
<tr>
<th></th>
<th>Earnings</th>
<th>Multiple</th>
<th>Target</th>
<th>Total Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Forecast</td>
<td>$160</td>
<td>17–19</td>
<td>2800–3000</td>
<td>6–13%</td>
</tr>
<tr>
<td>Upside case</td>
<td>$175</td>
<td>19</td>
<td>3300</td>
<td>19%</td>
</tr>
<tr>
<td>Downside case (recession)</td>
<td>$120</td>
<td>18</td>
<td>2200</td>
<td>–25%</td>
</tr>
</tbody>
</table>

**Strategy**

For fiscal 2019 we have a positive outlook on the equity markets. We are balanced between growth and value factors. Although by some measures value is quite 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 aspect of the market.

Volatility has increased dramatically since January although it is 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 be monitoring closely leading indicators of economic and financial market stress.

Currently, domestic equities represents 28.7% of total assets — slightly below the 29% neutral target weight. This weight is scheduled to decrease to 28% when the new asset mix is fully implemented on Oct. 1, 2018. We would expect to remain close to the neutral target weight throughout the fiscal year as the new weight is phased in.

**Initiatives**

We will continue to monitor closely 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 continue to move forward with a project to allow us to short equities. We are in contract negotiations with the relevant parties that would allow this to happen. The next step would be to finalize the operational aspects of the program and to develop strategies within the portfolios to utilize the facility. We would expect any ramp-up to be gradual, and when fully implemented it should not significantly impact the risk profile of domestic equities. This would enable domestic equities to better exploit poor performing stocks to fund our best ideas.

We are in the final stages of implementing a factor-based index strategy that will replace some of our passive assets. Implementation of the portfolio is expected to be at the beginning of the fiscal year 2019. The initial size of the portfolio will be relatively small, approximately $250 million to be funded out of passive assets, however 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 2018, the international markets are recording above normal returns, with particular strength in the emerging markets. The MSCI World ex-US (50% Hedged) Index for developed markets has increased 9.4% through the end of April, while the MSCI EM Index for emerging markets has increased 17.0%. 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 10.9%. At this writing, staff anticipates total returns earning normal levels in line with the long-term policy return of 7.55% in fiscal 2019.

Developed Markets

The developed market returns in fiscal 2018 have been boosted by synchronized economic growth and continued easy monetary policies from major central banks. The supportive market conditions helped half of the 22 constituent countries earn returns above 10%. The 9.4% overall return for the 50% hedged benchmark through the end of April was slightly lower than the unhedged benchmark by 0.9 percentage points due to the U.S. dollar weakening against the euro, pound and yen. Staff expects U.S. dollar movements to be in a tighter range and to have a limited impact on overall international returns in fiscal 2019 as the upside and downside pressures are roughly balanced. The total return in fiscal 2019 for the developed markets is forecasted to be normal with most of the return coming from single-digit earnings growth. Since forward-looking valuation multiples are now nearly matching the historical averages for the past ten years, expansion potential for the overall market is limited. 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.

Prime Minister Abe’s cabinet approval ratings in Japan have plunged after a series of scandals. His chance of being reelected as LDP party leader this September has diminished and the party may replace him with another internal candidate if his ratings continue to deteriorate. The Japanese economy itself is doing better, with unemployment at record lows and wages rising at the fastest pace in two decades. However, Japan’s declining working age population implies that the country will continue to rely on overseas markets for growth. Given the country’s reliance on exports of goods and services, it is important that the yen remains at a competitive level versus major currencies. Consensus expectations are for the Bank of Japan to change little on the monetary policy front over the next twelve months, so long as the yen remains within the 100–115 currency exchange band versus the U.S. dollar. On consensus forward valuation multiples, the Japanese equity market continues to trade at a discount to overall developed markets. However, relative to its own history, the market appears fairly valued — with valuation multiples matching historical averages.

In Europe, a landmark event on the horizon is the United Kingdom’s scheduled exit from the European Union on March 29, 2019. This will be followed by a 21-month transition period to finalize trade deals and regulations. Negotiations are expected to be challenging with various possible outcomes, though the worst case scenario of no agreement looks unlikely. In the meantime, political instability within the United Kingdom is a risk as Prime Minister Teresa May attempts to hold on to her position as head of the Conservative party. The pound has largely recovered from its fall experienced immediately after the Brexit vote, thus easing inflationary pressures and affording the Bank of England more flexibility with monetary policy. Expectations for policy interest rate increases over the next twelve months have been reduced, though this could change should the pound weaken again. United Kingdom’s equity market valuation appears somewhat attractive relative to its history and developed market peers. However, its risk premium should be higher than normal for the aforementioned reasons and earnings growth may be overly dependent on a few late cycle sectors including energy and materials.
The euro strengthened versus the U.S. dollar in fiscal 2018 due to an improving economy in the region — plus the market anticipated that the European Central Bank will wind down its asset purchase program by the end of calendar 2018. However, the central bank’s guidance indicates that reinvestment of the principal payments from maturing securities will continue for an extended period. Also, several factors may cause the central bank to delay and then move only gradually to raise policy interest rates, including the potential for slowing exports due to euro appreciation, actual inflation undershooting the 2% target, and disruptive global forces such as possible trade wars.

Within Germany, Chancellor Angela Merkel’s influence has weakened, as her conservative base lost a large number of seats during the last federal election and was forced to form a grand coalition with the Social Democrats. Legislation will be much more challenging as the center of German politics is being challenged by populist forces such as the Alternative for Germany party — now the largest minority party in the Bundestag with 13% of the seats. Despite political fractures, Germany’s economy remains in good health thanks to favorable interest rates, record low unemployment, stable fiscal conditions and external demand for German goods. Given the strong linkage of the German economy to exports, a major risk is appreciation of the euro rendering its exports less competitive. In fact, many German export-oriented companies have already reported earnings headwinds due to a stronger euro. Furthermore, should trade wars between the United States and its key trading partners escalate, Germany may suffer significant consequences. The consensus high-single-digit earnings growth forecast over the next fiscal year has room to fall should such a scenario take hold. The German equity market is trading in line with its own long-term history and its developed market peers, thus it does not appear to offer significant upside.

Merkel’s descent in political power contrasts with the rise of French President Macron, whose supportive majority in Parliament has allowed him to quickly initiate his reform agenda with hopes of reducing the structural unemployment rate, improving corporations’ global competitiveness, and eventually narrowing the fiscal deficit. Successful reform implementation in France could help to accelerate real GDP growth, driven by private consumption, housing construction and business investment. Accelerating real GDP growth would propel the earnings growth of French corporates, especially those sensitive to the economic cycle. Likely reflecting the positive outlook on politics, economics and earnings, the French equity market appears slightly expensive relative to its own history and developed market peers.

Elsewhere in Europe, the political situation in Spain has deteriorated as ex-Prime Minster Rajoy was forced out of office in June 2018 by a no-confidence vote in parliament, leaving the socialist leader Sanchez in charge. The new government may not be sustainable, however, given the parties’ divergent policy proposals and contrasting views toward the independence movement in Catalonia. The uncertainty in Catalonia is taking a toll on its economy, with a decline in tourism, a slowdown in retail sales and a contraction in the housing market threatening to take away the positive impact of a multiyear economic expansion. Given the importance of Catalonia to Spain as a whole, a prolonged contraction in the region could have a detrimental impact on the country’s overall economic growth. The Spanish equity market appears to reflect much of the uncertainty as the market is trading below its history and developed market peers.

Italy’s general election in March 2018 resulted in strong showings of the anti-establishment Five Star Movement and the right-wing Northern League, with neither of their leaders having any experience in national government. As of this writing, a coalition government was formed with law professor Giuseppe Conte serving as Prime Minister and the two parties’ leaders serving as joint deputy prime ministers. While Conte may serve a ceremonial role with the real power residing with the two deputies, it is unclear how sustainable and productive this relationship will become. Further, given the euro-skeptic stance of both parties, their new coalition government could collide with the European Union on issues including immigration and fiscal policies. Italy may also find itself at odds with the European Central Bank as it focuses on the continued cleanup of the Italian banking system. The attractiveness of Italy’s equity market is contingent upon the continued de-risking of its banks’ balance sheets, political stability in the country, and more broadly, better returns on assets and improved corporate governance across Italian companies.
Australia’s expansion continues as the domestic economy benefits from corporate tax cuts, healthy trade with China, and growing investment in much needed infrastructure in large metropolitan areas. With inflation well contained and the currency range-bound, little, if any monetary policy changes are expected over the near term. However, high real estate prices, trade tension between the United States and China, and further regulations on the financial sector are major risks to the Australian economy. The Australian equity market appears slightly expensive relative to its own history and developed market peers. With the market’s mid-single digit earnings growth forecast dependent on the late cycle materials sector and economically sensitive financials sector, the market does not appear particularly attractive at the current level.

In Canada, Prime Minister Justin Trudeau’s popularity and prospect of being reelected in October 2019 depend heavily on his ability to protect Canadian interests in the ongoing North American Free Trade Agreement (NAFTA) negotiations. The Canadian economy would be impacted by weakening exports and the current high consumer leverage is a risk factor. Earnings growth estimate of approximately 10% for fiscal 2019 may prove optimistic given its high reliance on energy and materials companies. While the Canadian equity market is trading slightly below its own historical averages, it remains more expensive relative to its developed market peers and may have room to correct if trade tensions with the United States escalate.

**Emerging Markets**

The emerging market returns in fiscal 2018 have been robust for a second consecutive fiscal year. The 17.0% return in emerging markets through April in fiscal 2018 has been driven by earnings growth that nicely surprised the market and led to positive revisions to earnings forecasts during much of the fiscal year. However, the positive revisions for the overall emerging markets have stopped as of this writing and this has been a contributing factor to the subdued emerging markets performance so far in calendar 2018. Higher interest rates in the United States are also contributing to market concerns about specific countries and companies in emerging markets that are more susceptible to adverse consequences from tightening liquidity if there are foreign investor portfolio outflows. Staff forecasts that the emerging markets in fiscal 2019 will earn a normal return primarily due to forecasted earnings growth approaching 10%.

The valuation in emerging markets is near long-term historical averages on both trailing P/E and trailing Price/Book Value multiples. Therefore, staff assesses the overall valuation to be fair on an absolute basis but there is some risk for contraction in the valuation multiples if more emerging market countries have to increase policy interest rates to protect against inflationary pressures that might develop from weakening currencies and higher oil prices. The valuation multiples in the emerging markets remain at significant discounts relative to the current levels in developed markets. There are some sectors such as energy and financials that still trade at single-digit forward P/E multiples and could offer attractive returns if the favorable global economic environment continues and certain risk factors don’t occur. However, the valuations in the China internet industry appear unattractive, and currently four of the seven largest constituent members in the overall emerging markets benchmark are exposed to this industry.

China has been able to continue to grow its economy above a 6% real rate despite both curtailling some production in polluting industries during the winter months in fiscal 2018 to help improve air quality and continuing to implement financial reform measures to try to contain debt-related risks. President Xi Jinping consolidated his power at the twice-a-decade National Congress of the Communist Party held in October 2017 and then later in March 2018 he was approved to be able to remain in office with no limit on length of service. Post the National Congress, President Xi could have opted to forcefully implement more drastic measures on deleveraging, but the current reform plans appear to be more moderate with the unsurprising goal to have a stable macro environment. Perhaps the authorities in China are being cautious with reforms until they see the actual results from the negotiations with the United States on trade policies.
China is now one-third of the overall emerging markets benchmark, so its market direction continues to have a significant impact on the performance of emerging markets. Many of the other emerging market countries remain exposed to economic developments in China. The next two largest countries in the emerging markets, South Korea and Taiwan, combine for another 26% of the benchmark. Both countries have important companies that operate significant manufacturing facilities within China for export that could be negatively impacted if there is a trading war between China and the United States. Also, current geopolitical risks could intensify for both countries if the trade negotiations go awry. China could interfere and cause North Korea to reject better relations with South Korea and the United States. Also, Taiwan would be impacted if unsuccessful trade negotiations cause an increase in the friction coming from the different interests in Chinese and American policy toward Taiwan’s independence.

There will be several important elections in fiscal 2019. The surprising results in the national elections in Malaysia in May 2018 reinforce that pre-election polling and hence, market assumptions about likely winners, may be unreliable in these upcoming elections. Mexico’s general election will be held on the very first day of fiscal 2019. Andres Manuel Lopez Obrador, known as AMLO, is leading the polls for the presidential election. He has previously run in other elections as a populist firebrand who has scared the markets but he is being more measured in his discussions with investors during this election. The markets are anticipating that even if AMLO wins the election he will not have enough support in the new congress to pass much market-unfriendly legislation. However, AMLO would be able to make some impactful changes on the regulatory front and his administration could be a thorn in NAFTA negotiations if that process isn’t completed by the time he would take office in December 2018. There will be an election in Brazil in October 2018 with a wide-open race with different scenarios possible due to massive corruption investigations in the country that resulted in the prohibition of candidates such as former President Lula who had higher name-recognition. Brazil has a serious fiscal situation that needs addressed post the election but there could be a new president and congress who are unwilling to implement politically unpopular measures until the markets force them. Finally, India is due to have a general election no later than May 2019 and the incumbent coalition led by the BJP is favored by the market.

**STRATEGY**

As fiscal 2018 draws to a close, the international portfolio is approximately $19.3 billion or 24.8% of total assets (includes 0.8% of total assets in Global Equities), above the neutral target weight of 24%. The international asset class was positioned at a moderate overweight versus the neutral target weight throughout most of fiscal 2018, except for a short period in March 2018 when withdrawals from the asset class were occurring in advance of the neutral target weight being reduced from 25% to 24% on April 1. Additional withdrawals from the asset class occurred during market strength and when the neutral target weight was reduced from 26% to 25% on October 1. The net cumulative flow of funds out of the asset class in fiscal 2018 through the end of April was $3.0 billion. Staff is projecting a normal 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 overweight versus the target weight in fiscal 2019 unless the risk/reward outlook becomes less favorable. The target weight will be reduced one last time from the current 24% to 23% on July 1, 2019, as the final part of the phase-in of the reduction in the international asset class policy weight 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. This change to an all-cap investment mandate occurred without an increase to the fee structure and currently has resulted in an additional $110 million of small cap exposure for the overall international portfolio. Staff members on our international quantitative team have begun to access small-cap data and are working to utilize the data in our existing systems. The goal will be to build successful, alpha-generating models by the end of fiscal 2019 so that small capitalization stocks can be included into the quantitative portfolios at a later date.
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 finally announced in June 2017 that certain China A-shares would be included in the emerging markets benchmark starting in June 2018 on a limited basis. MSCI will now implement this inclusion process in two stages in calendar 2018 and the pro-forma weighting of the A-shares in the overall emerging markets benchmark will be less than 1%. However, this weighting percentage will likely be increased by MSCI in the future through additional phase-ins after a review period to diagnose if there were any unanticipated issues with the current implementation for foreign investors. Staff anticipates that MSCI may announce in June 2018 that both Saudi Arabia and Argentina will be included in the emerging markets benchmark at a scheduled future date. Staff has begun investigating with our custodian the investment procedures required for foreign investors to access the local exchange in Saudi Arabia. Investing in Argentina is less complicated and staff already has previous experience with owning stocks listed in the local exchange. Actual purchases in any of these countries will depend on the investment thesis decisions made by the individual portfolio managers.

There were no changes made to the external manager lineup related to hiring or termination in fiscal 2018. 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, and to properly balance the overall portfolio versus the target weight when the aforementioned final reduction in the policy weight is implemented. 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. Staff will continue to monitor and evaluate the proper allocation of risk across the international portfolio with due awareness that market volatility may increase. Any new allocations to the asset class in fiscal 2019 will likely be made to actively managed portfolios and not to the passive core-EAFE component.

The chart below shows the allocations for internally managed, externally managed, developed and emerging markets investments. At fiscal year-end 2018, we will be near a 78%/22% split between the developed and emerging markets within the asset class, which is overweighting the emerging markets compared to the 80%/20% neutral points set for each. Staff anticipates that the developed/emerging split will be moved closer to the neutral points early in fiscal 2019 because the total return forecasts for each are converging to similar expectations. As shown below, the split between externally and internally managed funds is 42% external and 58% internal.

<table>
<thead>
<tr>
<th>FISCAL YEAR-END 2018 (estimated)</th>
<th>$ Invested (at Market)</th>
<th>Percent of International Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Managers</td>
<td>$ 7,930 million</td>
<td>42%</td>
</tr>
<tr>
<td>Internal Managers</td>
<td>$10,764 million</td>
<td>58%</td>
</tr>
<tr>
<td></td>
<td>$18,694 million</td>
<td>100%</td>
</tr>
<tr>
<td>Developed Markets</td>
<td>$14,566 million</td>
<td>78%</td>
</tr>
<tr>
<td>Emerging Markets</td>
<td>$ 4,128 million</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>$18,694 million</td>
<td>100%</td>
</tr>
</tbody>
</table>

As of April 30, 2018, $606 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, 2018, the benchmark return stands at 3.58% and will likely finish the fiscal year in the 5–7% range. While private real estate is slightly better than anticipated, the primary driver of underperformance is public market real estate, which was the case last fiscal year as well.

Public market real estate (REITs) has returned negative 5.9% fiscal year to date through March, although staff anticipates returns will finish the year slightly positive. Not since the financial crisis have REITs turned in two years in a row.

As of March 2018, the total return for private market real estate, as measured by NCREIF Property Index (NPI), is 5.3% fiscal year to date — the same as 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 2018, 5% fewer properties were sold on a trailing four-quarter basis compared to this time last year, as measured by NPI, yet the dollar volume sold is essentially the same versus this time last year. Only two times in the last five years have fewer properties sold on a moving four-quarter basis. The percentage of the properties sold from the NPI, at 9%, is significantly below the peak since the start of this cycle back in 2010. According to Real Capital Analytics (RCA) — a broader measure of market activity — the trailing four quarters’ dollar transaction volume for single asset sales (as of March 2018) is down marginally on an overall basis at just negative 2% from last year at this time. The retail sector had the largest decline at 9%, with office down just 2%. Apartments had the largest increase at 27%, with industrial increasing by 10%.

Cross border investment was down 23% in calendar 2017 vs. 2016, with domestic investor activity down just 3% according to Real Capital Analytics. Cross-border investors represented approximately 11% of activity for the 12 months ending December, 2017. This is down from 14% and 18% in 2016 and 2015 respectively, although in line with long-term levels. Canada reclaimed the top spot in 2017 as the largest cross-border investor, with dollar volume of $21 billion capturing 34% of total volume. Singapore was the second largest investor with $9.6 billion. Investment from Chinese investors fell 64% to $6 billion, dropping it to the third spot from the number one spot in 2016. The region with the largest decline was the Middle East, down 70% — although the dollar volume was just under $3 billion. For context, Canada’s investment activity covered more than 500 properties, while the Middle East just 68.

Although transaction activity is down over the past year and interest rates are up, cap rates have continued to decline, albeit slightly, based on NPI. This holds true for both properties sold and properties valued within the NPI. According to Real Capital Analytics, transaction cap rates are flat to marginally up across the four traditional property sectors, with spreads to 10-year U.S. Treasury yields having narrowed. Industrial is the exception, with cap rates having declined 46 basis points since this time last year. It is not surprising that NPI cap rates are lower overall than RCA, as NPI represents only core properties held in a fiduciary capacity. RCA represents a broader variety of properties with a wider range of dollar size and investor composition.

Over the course of the fiscal year, monthly REIT returns ranged from –8% to +4%, with seven negative months through March — showing the volatility of the public market as compared to private market real estate. Through March, total return for REITs stand at negative 5.9% versus negative 3.2% at this time last year. The health care sector has been the hardest hit with negative returns of 19%. Other than industrial (up 7%) all other sectors have negative returns for fiscal year through May — demonstrating the breadth of the weakness in the REIT sector. According to Green Street Advisors, the mall sector is trading at approximately a 20% discount to the value of the underlying real estate, while industrial is trading at an 8% premium; the group as a whole currently trades at an 8% discount. In fiscal 2019, staff anticipates the blended benchmark total return will meet the Retirement Board’s long-term expected return for the asset class (6.00%).
Property Markets

As discussed last year, the single biggest concern for apartment investors over the last several years has been the amount of supply coming on line. According to CoStar, more than 300,000 units have been delivered in each of the last two years. This represents 2.1% of current inventory — a peak since the last cycle. CoStar forecasts continued deliveries at this level for 2018 and 2019 with more than 200,000 units each year through 2022. Despite the level of new deliveries, demand has remained strong — but it has not kept up with new supply. Absorption falls slightly short at 1.9% of current inventory vs. the 2.1% of new supply. Most new construction is located in urban/infill and transit-oriented locations. Due to escalating construction costs and high land prices in these urban markets, about 90% of the new product delivered is in the upper end/luxury segment. As a result, this segment has seen modest concessions such as free rent on both new and renewal leases. Despite the current supply-demand imbalance, both CoStar and NPI vacancy rates — while different figures — have not moved much, although CoStar forecasts vacancy to rise to 7% in 2019. National rent growth has been slowing, although this varies between markets depending on the level of supply and vacancy rates. Demand is expected to remain strong as almost 25% of millennials aged 24–36, approximately 12 million young adults, live with parents, according to a report by the Zillow Group, and moving to an apartment is usually the next step. It should be noted that immigration is also a strong driver of demand in this sector and the uncertainty associated with policy changes and enforcement could have a dampening effect.

Similar to apartments, the amount of new office construction has been a concern. Nationally, there is in excess of 100 million square feet under way, similar to last year, with peak deliveries expected over the next 12–18 months. According to Cushman and Wakefield, the ten markets with the largest pipelines of new office construction account for 46% of the total, with the pipeline concentrated in high-growth markets. These markets typically perform well over a cycle, in part because they are supply constrained, with vacancies typically below average, rent growth above average, and strong job and wage growth. Over the past two years, Cushman and Wakefield estimates office using industries in these ten markets grew 5.6% compared to 3.8% for the United States. According to CoStar, New York, the largest office market in the United States, has the highest level of product under construction at 24 million square feet, although this represents only 2.7% of its current inventory.

San Francisco has the highest percentage of inventory under construction at 5.2%, but the total square footage under construction is just under nine million square feet. There are important differences between the construction taking place in these two markets. San Francisco is due to new demand related to job growth in mostly high paying sectors. Most of the space was pre-leased before or close to construction completion. New York on the other hand, is offering new, modern office product — the likes of which has not been seen before on this scale — in a new submarket known as Hudson Yards on the west side of Manhattan. This new product and location is designed to appeal to the newest generation of workers and includes residential, a variety of retail formats, restaurants, a hotel and 14 acres of public open space. Similar to San Francisco, large blocks of space were leased before construction started in many cases. The difference in New York is the absorption of the new supply is in large part due to relocations of tenants from other parts of the city as opposed to an increase in absolute demand as is the case in San Francisco. According to CoStar, national vacancy rates have been in the 10%–11% range since 2014 with supply and demand essentially in equilibrium. As a result, rent growth should be roughly in line with inflation. Growth rates peaked in 2015 at almost 6%, and have been slowing to the current rate of 1.8%.

As was the case the last two years, the industrial sector was the highest performing property type of the NPI. While retail continues to suffer from the continued growth of e-commerce, the industrial sector is the big beneficiary along with increased demand from global trade. According to CoStar, there has been positive net absorption since 2010, with absorption in excess of 250 million square feet for each of the last four years, the bulk of it in the logistics subsector. The historical average is less than 150 million square feet, driving vacancy rates to 5% — down from over 10% in 2010. Based on NPI, which is a more concentrated portfolio, vacancy rates fell to 3.7% — less than half of the 10-year average. To date, demand has been able to keep up with new construction which has been significant over the last few years according to CoStar. In 2017, 237 million square feet was delivered — the peak since the last cycle. New construction is forecast to continue with new deliveries in excess of 200 million through 2021. The record low vacancy is, in turn, driving rent growth above 6% for the last three years according to CoStar. A significant portion of projects under construction is speculative with no pre-leasing as compared to earlier in the cycle where most construction was of the less-risky nature of build-to-suit projects.
Last year at this time, the retail sector had been able to hang on as the second highest performing sector. However, as of the quarter ending March 2018, the sector is solidly in last place of the four traditional sectors over the last year, with negative appreciation in the March quarter. Vacancy rates in NPI declined to just under 7%, which is below the 8.5% for the 10-year average. According to CoStar, the vacancy rate in its broader data set indicates 4.6% — the lowest level since 2006 and rents that are now more than 3.5% above their pre-recession peak. Despite this good news, absorption in the March 2018 quarter was the lowest in two years, with negative absorption of almost 600,000 square feet. However, it is important to note that the mall and power center segments totaled more than three million square feet of negative absorption, with neighborhood and strip centers turning in more than two million square feet of positive absorption. This is indicative of where e-commerce has had the largest negative impact on retailers. Sales of “commodity” like goods such as apparel, toys, and electronics that can be easily duplicated with online purchasing have been the most at risk, which are historically the mainstay tenants at malls and power centers. The type of centers that provide convenience and necessity-based retail and services are more insulated from e-commerce. Younger shoppers, in particular, are looking for “experiential” type centers — locations that provide experiences, such as restaurant and entertainment rather than traditional “product” focused centers. These types of centers, particularly those that are located in urban infill and transit-oriented environments, have the best outlook as they are typically located in or near large population centers, and experiential retail can not be replaced with online purchasing. Unlike other property sectors in real estate that are experiencing high levels of new construction and deliveries at this point in the cycle, retail is not. According to CoStar, approximately 70 million square feet was delivered in 2017, and as of March 2018 approximately the same amount is under construction. The historical average is closer to 100 million square feet, with the last cycle peak in 2007 at over 200 million square feet in new deliveries. The lower level of new construction will aid in the recovery of the overall sector going forward.

Returns

After six calendar years of double digit returns through 2015 for the NPI, the longest on record, 2016 and 2017 saw single digit total returns of 8% and 7% respectively. The table below demonstrates the changes in private real estate returns during the last three years as of March 31, 2018. The NPI represents 85% of the STRS Ohio Real Estate Blended Benchmark.

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 averaged 1.9% on an absolute basis, which represents just under 20% of the average total return. Dating back to the years just before the recession, the capital markets have been the primary driver of returns, both positive and negative, with the peak in calendar 2005 at 63% of total return attributable to price appreciation. On a one-year trailing basis as of March 31, 2018, appreciation is 34% of the total return, the same as last year at this time — down from 57% two years ago. This is not surprising, as the outsized price returns were not sustainable over the long term. While the primary appeal of real estate is its high income component, the attribution of returns, between income and price, will not likely go back to 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 3.4% in the 12 months ending March 2018, which is down significantly from the previous two years, although essentially the same as its 10-year average and about 25% above its 30-year average. However, the industrial sector enjoyed extremely strong NOI growth of 9.4%, up from 6.8% in 2017 and significantly higher than its 10-year average of 2.3%. The west region also had strong NOI growth at 6.3%, up slightly from 2017 but much higher than its 3.7% 10-year average growth rate.

<table>
<thead>
<tr>
<th>NCREIF PROPERTY INDEX (NPI)</th>
<th>One-Year Ending</th>
<th>Income</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 31, 2018</td>
<td>4.7%</td>
<td>2.4%</td>
<td>7.1%</td>
<td></td>
</tr>
<tr>
<td>March 31, 2017</td>
<td>4.7%</td>
<td>2.5%</td>
<td>7.3%</td>
<td></td>
</tr>
<tr>
<td>March 31, 2016</td>
<td>4.9%</td>
<td>6.7%</td>
<td>11.8%</td>
<td></td>
</tr>
<tr>
<td>Three-Year Annual Average</td>
<td><strong>4.8%</strong></td>
<td><strong>3.8%</strong></td>
<td><strong>8.7%</strong></td>
<td></td>
</tr>
</tbody>
</table>
Although the forecast is for rising interest rates, a near-term significant negative impact on private real estate values is not expected for several reasons. There is a significant amount of capital allocated to real estate that has not been deployed. Real estate is now an integral part of institutional portfolios with long-term allocations that are not likely to be reduced. The increase in the 10-year U.S. Treasury yield has narrowed cap rate spreads a bit, keeping cap rates relatively low and unchanged. There is a view that spreads have more room to narrow, which could be the case as long as the economy continues to grow and real estate fundamentals remain favorable. However, it is inevitable cap rates will rise, albeit slowly. Growth in net operating income (NOI) over time will offset some of the increase in cap rates due to interest rates. However, NOI growth slowed considerably over the last year, although in line with its 10-year average based on NPI. The slowdown is not unexpected given we are at the mature phase of the cycle and there was a pull back in rent growth due to the level of new deliveries in recent years. New supply is expected to remain elevated in some sectors for another year or more. If NOI growth doesn’t at least level off, values will likely not be able to be maintained over the medium term. Staff expects total returns to be positive in fiscal 2019, but appreciation could range from slightly negative to slightly positive 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, in general, and specifically as REIT returns experience a more immediate negative pricing impact to rising interest rates and weaker overall investor sentiment. Over the last 20 years, excluding the two-year period during the financial crisis, REITs as a whole have only had one instance of two consecutive years of negative returns. REITs continue to face headwinds — higher interest rates and weaker relative earnings growth (to the S&P 500) expected next year, and diminished investor sentiment. Additionally, in terms of valuation, REITs are trading at a 4 point multiple premium relative to the S&P 500 which is higher than the 25-year historic multiple premium of 2.5 points; again, not providing a catalyst for increased REIT valuations.

REIT valuation is currently considered “fair” on an overall relative basis according to Green Street Advisors and the dividend yield is approximately 4.5%. REITs are expected to have a total return in the 4.0% to 5.0% range.

Staff anticipates the blended benchmark total return for the asset class in fiscal 2019 to meet the Retirement Board’s long-term expected return for the asset class (6.00%). However, private market transaction pricing on new acquisitions is expected to be, on average, at or below the Retirement Board’s long-term expected return.

The table below outlines the expected range of returns, based on property type, for transaction market pricing in fiscal 2019. The initial yield expectations for both retail and office have increased 50 and 25 basis points respectively from last year. STRS Ohio is targeting retail in urban and infill locations, which is a more competitive subsector of retail, and accounts for lower expected returns than the overall retail sector. Industrial was lowered by 50 basis points last fiscal year to reflect the extremely competitive sector, given its strong fundamentals and significant capital allocated to the property sector. Staff anticipates fiscal 2019 to remain competitive for the industrial sector. There was no change in return expectations for the apartment sector.

<table>
<thead>
<tr>
<th>Property Type</th>
<th>Initial Yield*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>3.75%–6.00%</td>
</tr>
<tr>
<td>Apartments</td>
<td>3.75%–5.00%</td>
</tr>
<tr>
<td>Industrial</td>
<td>4.00%–6.25%</td>
</tr>
<tr>
<td>Office</td>
<td>5.00%–7.25%</td>
</tr>
</tbody>
</table>

*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 April 30, 2018, the real estate asset class is approximately $7.7 billion — up from $7.4 billion at the beginning of the fiscal year. This translates into a weighting for the asset class of approximately 10%, matching its 10% neutral allocation. This is up slightly from a weighting of 9.8% at the start of the fiscal year.

As stated in last year’s annual plan, staff identified more than $300 million in assets for disposition in the direct portfolio for fiscal 2018. By fiscal year end we expect to have sold approximately $150 million. The remainder is slated to be sold in fiscal 2019 with a couple of assets already in process. Staff will continue to evaluate other assets in the portfolio for potential sales. These sales will free up capacity for new acquisitions in fiscal 2019.

### 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 — estimated as of March 31, 2018, plus the acquisition in April of 10 Hudson Yards (“10HY”) office building in New York City — is diversified across the four regions, although concentrated in a few large cities in each region. Both the East and West acquired assets of just under $200 million but the significant valuation gains in the West increased its weighting from 31% last year while reducing its underweight to the benchmark. Both the absolute and relative weighting in the East declined slightly. The Midwest reduced its weighting from 22% last year as dispositions exceeded the region’s acquisitions, although its relative weighting to the benchmark increased. Both the absolute and relative weighting in the South remained the same. There are sales anticipated in each of the regions in fiscal 2019.

```
<table>
<thead>
<tr>
<th>GEOGRAPHIC DIVERSIFICATION (CORE ONLY)</th>
<th>STRS Ohio</th>
<th>STRS Ohio vs. NPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>36%</td>
<td>1.10X</td>
</tr>
<tr>
<td>Midwest</td>
<td>19%</td>
<td>2.19X</td>
</tr>
<tr>
<td>South</td>
<td>10%</td>
<td>.52X</td>
</tr>
<tr>
<td>West</td>
<td>35%</td>
<td>.91X</td>
</tr>
</tbody>
</table>
```

*Includes 10HY acquired in April 2018

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, as well as higher expected growth over the long run. However, on a very select basis, additional markets may be considered for a particular property type. The significant underweight in the South is expected to continue for the next several years as the portfolio is going through a rebalancing, which is a multi-year process. Additionally, a significant portion of the portfolio loan is “allocated” to south region assets, which reduces its overall weighting in the portfolio.
**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 acquisitions in three of the four regions. This increase resulted in declines in the absolute weighting of both the apartment and retail sectors with industrial holding steady due to significant valuation increases. However, the relative weighting to the benchmark for both the industrial and retail sector declined while the apartment sector increased to a neutral weighting vs. the benchmark.

<table>
<thead>
<tr>
<th>PROPERTY TYPE DIVERSIFICATION (CORE ONLY)</th>
<th>STRS Ohio</th>
<th>STRS Ohio vs. NPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment</td>
<td>24%</td>
<td>1.00X</td>
</tr>
<tr>
<td>Industrial</td>
<td>18%</td>
<td>1.12X</td>
</tr>
<tr>
<td>Office</td>
<td>42%</td>
<td>1.14X</td>
</tr>
<tr>
<td>Retail</td>
<td>16%</td>
<td>.69X</td>
</tr>
</tbody>
</table>

*Includes 10HY acquired in April 2018

STRS Ohio has several apartment projects under development with completions nearing and two additional projects in the early stages of construction. 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 location which appeal to the younger population who 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 recent uptick in the rate of home ownership, there is still an affordability issue in many markets and lack of inventory at the starter home price level.

The industrial sector, which is the second largest overweight to the benchmark, was STRS Ohio’s top performing property type for the third year in a row at just over 19%. This sector has been the most competitive over the last few years for new acquisition. STRS Ohio currently has one development joint venture which closed last year that is set to break ground on three new buildings in Southern California.

Staff expects to finalize the sale of the remaining assets in the second of two very successful value add industrial joint ventures. As a result, staff will be looking to add to the portfolio in this sector.

STRS Ohio acquired new office projects in transformational areas of New York and Seattle, which we believe are better positioned to capture the next generation of talent. We will continue to rotate out of older, more traditional office investments in the portfolio in an effort to upgrade from either a locational or physical structure standpoint. Due to the anticipated office property sales in the south, staff will target office acquisitions in the south region if there are opportunities next year in submarkets we believe will perform well over the long run.

The largest underweight in the portfolio is the retail sector. As mentioned earlier, dominant centers — particularly in urban and infill locations, as well as grocery anchored shopping centers — are expected to provide stronger long-term returns. It is important to be very selective in the retail sector, as location and anchor 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 update in March 2018, staff continues to pursue two new property sectors — senior living and medical office, as they appear to provide uncorrelated returns to traditional core real estate. The preference is to find “pure-play” fund managers that focus exclusively on one specific sector. We are conducting due diligence on a couple of managers for senior housing, but don’t expect a capital raise until late fiscal 2019. There also doesn’t appear to be near-term fund opportunities in medical office. In an effort to gain more near-term exposure, we are conducting due diligence on one of the leading sponsors of an open end multi-strategy fund which focuses...
on both medical office and senior living, as well as student housing and self-storage. These two additional niche sectors also provide uncorrelated returns with traditional core real estate but with a smaller investable universe.

**Property Life Cycle**

As mentioned earlier, industrial assets are still in high demand by investors, given the continued positive outlook for the fundamentals. This puts additional pressure on yields that are already at 4%, and may make development an attractive route to access this property type as staff did in fiscal 2018. 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, 2018, the leverage ratio is approximately 28%. There is no long-term debt maturing in fiscal 2019. The leverage ratio includes STRS Ohio’s $250 million portfolio loan which matured in May 2018. Staff renewed this loan for a one-year period at a fixed interest rate of 2.99%, up from 2.53% the previous term. Staff will evaluate whether to renew or pay off the loan closer to maturity, 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:**

**Portfolio Composition:**

- 8.2% of total real estate
- $628 million total portfolio
- $604 million in unfunded commitments
- 26 funds with 12 managers
  - 47% Europe
  - 33% Asia
  - 14% Latin America
  - 6% United States (via global fund)

**2018 Activity:**

- Commitments to five funds totaling $310 million were made during fiscal 2018, allocated 60% to Europe and 40% 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 75% invested within three years.

- Structural changes in logistics brought about by e-commerce warranted the addition of funds targeting that sector. As such, a new manager was added to the portfolio with an established platform encompassing the major markets in Asia and Europe and demonstrated experience investing in logistics. Due to the relative size of industrial transactions and the narrow window of opportunity, the funds were sized at less than $550–$750 million each, with two-year investment periods.

- The level of capital drawdowns was as expected; however, distributions outpaced contributions at a slightly higher than expected 1.6 to 1 ratio. This is attributable to two factors: 1) the market value of the portfolio was 1.5X the unfunded commitment balance as of fiscal year end 2017; and, 2) approximately 19% of the current year’s distributions were realized from assets in the early stage of their life cycle which is atypical — reflecting managers ability to achieve forecast exit pricing ahead of their business plans.
• Transaction volumes in the markets where the managers are active, while off from their 2015 peak, remained healthy — allowing the managers to maintain their sales activity as they continue to create product that appeals to core buyers.

• 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 — $180 million (29%) — 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 — $280 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 through repositioning and value increases are recognized. The majority of the best-performing assets are sold during this period.

• Mature Stage — $83 million (13%) — assets held at least 60–84 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 — $84 million (13%)
  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 (nine–10 years) and limited partners do not grant fund extensions.

Returns:

• Fiscal year-to-date as of March 31 — 11.4%
• Trailing five years as of March 31 — 14.1%

• Returns have been positive across all funds with a majority of the funds posting double digit returns. Contributing factors were: 2016 vintage funds posting above average returns earlier than expected; 2010 and older vintage funds experiencing higher than expected realizations and returns; and, Latin America funds posting positive returns as a whole which offset the negative impact of the currencies.

Regional Overview:

• Even though cap rates for prime European real estate are at a cyclical low, the yield spread that the asset class provides against government bonds remains high in a historical context. Although transaction volumes are off from the 2015 peak, there is still clear demand from global investors for prime real estate which will likely maintain yields at their present levels. Economic indicators are also positive, with Oxford Economics projecting GDP growth at or above the average in the major European economies for 2017–2021. On the supply side, there is a fundamental lack of prime space in the retail and logistics markets, both of which are undergoing structural changes driven by e-commerce. The limited availability of bank finance for development creates the opportunity to back cash constrained developers, or owners needing to be recapitalized. In the case of the U.K., the serving of Article 50 notice under the Lisbon Treaty has brought even more focus on the decision to leave the European Union (“EU”) and may lead to a market correction in some sectors or distress in either the listed sector or funds dedicated to the retail investor segment. These factors should both create buying opportunities for the fund managers and continue to draw capital to the region providing exit liquidity.
• The Asia Pacific region contains the second- and third-largest economies in the world — China and Japan. GDP and private consumption in the region is forecasted to exceed the United States and Europe for 2018 to 2021. While China and Japan have divergent demographic profiles and growth cycles, both countries have an abundance of capital seeking sustained yield. The weight of capital has given rise to foreboding factors: full pricing for transitional assets at cap rates of 4.5%–5.0%; increased partner risk; excess supply potential in certain submarkets; volatility of regulatory policies; and, over-leveraged/distressed owners. The presence of these factors create dislocations that can be exploited by well-established opportunistic investors. Such opportunities include: owner/occupiers’ disposing of real estate holdings to focus on their core business; budget-strapped governments selling real estate holdings; rapid pace of technological/demographic changes creating development opportunities; under managed public real estate companies creating public/private arbitrage plays; and, undervalued portfolios of sub performing/nonperforming loans. Add to this environment: favorable significant spread between cap rate to lender interest rate spreads; strong domestic liquidity for stabilized assets; and limited competition for underperforming/noncore assets. The region will provide opportunities for disciplined, experienced, well-positioned managers with defined strategies and proven execution capabilities.

• In Latin America, Brazil continues to recover from its political scandal, and Mexico confronts trade policy uncertainty while their currencies fail to achieve sustained appreciation. On the positive side, the Real and Peso have recovered from historic lows reached over the last two years; Brazil posted positive GDP in 2017 for the first time since 2014; and Brazil Central Bank interest rates are at an all-time low of 6.5%. However, until more favorable fundamentals appear on a sustained basis, new investments in Latin America will not be pursued.

Strategy:

• While distress still exists, it is not prevalent — so fiscal 2019 will have additional focus placed on pursuing strategies that can exploit market dislocations wherein the price of an asset becomes detached from the underlying market fundamentals in targeted markets; and transformation occurring due to changes brought on by e-commerce 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; and 3) China, on a very select basis in tier one cities with a focus on the industrial sector.

• 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 — Private Equity

Fiscal 2018 represents the 22nd year since a statute revision removed a limitation that restricted alternative investments to direct investments in Ohio companies or to venture capital firms having an office in Ohio. In May 1997, shortly after the statute was revised, the Retirement Board approved a broad domestic and global investment plan for private equity. Since then, the allocation to private equity has increased with each asset allocation or asset-liability study, until the most recent one, which held the allocation at 7%, where it has been since January 2014. In 2009, the scope of the alternative investment portfolio was expanded with the establishment of a second allocation called opportunistic/diversified. The private equity allocation is covered in this section and the opportunistic/diversified allocation is discussed in Section 10.

The following chart shows the fund commitment activity in the private equity portfolio since inception:

![PRIVATE EQUITY COMMITMENTS](chart)

Last year’s Investment Plan projected new commitments for fiscal 2018 ranging from $1.3 billion to $1.5 billion. However, as a result of a few fiscal 2019 commitments in our pipeline moving into the current fiscal year along with some differentiated new commitments that were not foreseeable this time last year, total commitments for fiscal 2018 are expected to be approximately $2.2 billion, as can be seen above. For fiscal 2019, staff is currently forecasting to make new commitments in the $1.5 billion to $1.8 billion range with the caveat that we could exceed the top end of that range once again as our efforts to opportunistically invest with our best managers in their funds and co-investment opportunities prove to be successful.

Favorable capital markets have still persisted, allowing managers to return proceeds to their limited partners through dividends, sales, and IPOs. Although distributions are exceeding contributions for the fifth consecutive year, the pace has declined recently.
The market for private equity purchases is supported by the availability of plentiful and attractive debt that has created selling or refinancing opportunities for our managers over the last few years and which translates into higher purchase price multiples on newly acquired portfolio companies. To invest this capital successfully, these managers have to maintain a strong investment discipline and demonstrate a differentiated ability to add value to the portfolio companies in which they invest. For example, successful strategies would include accretive merger and acquisition transactions, expanding into new geographical markets, adding new products, opening additional sales channels, and building strong management teams.

The invested level of private equity was 7.2% at the end of April, which exceeds its 7% target allocation. After several years of being range bound at the mid-6% invested level, private equity moved through the 7% level during the month of March, 2018.

The 25 commitments that are projected to be made in fiscal 2018 are distributed (on a dollar-weighted basis) among domestic buyout funds at 57%, domestic venture capital funds at 21%, and global/international private equity funds at 22%. For fiscal 2019, the potential types of funds within each category are unchanged and are listed below:

**Domestic Private Equity Funds**
- General buyout funds
- Industry-targeted buyout funds
- Growth equity funds

**Domestic Venture Capital Funds**
- General, early- to late-stage venture funds
- Industry-targeted, early- to late-stage investment funds

**Global/International Private Equity Funds**
- Private equity funds in established and/or emerging regions
- Venture capital and other types of private capital

The primary vehicle for private equity investments is commingled partnership funds with terms of 10+ years. In addition, funds-of-funds and separate accounts are being used selectively, despite the additional layers of fees, as a cost effective way to gain exposure to funds or investments that are difficult to access directly (e.g., the very top-performing venture capital funds, emerging markets funds, small buyout funds, co-investments and secondary purchases that can produce attractive expected returns net of all fees).

STRS Ohio does not anticipate selling any of its commingled fund investments in the secondary market and would only consider taking such action if we were significantly above our neutral allocation.

As in the past, the following investment opportunities will not be considered for the private equity portfolio: micro-cap stock funds; seed or “angel” funds; and economically targeted funds. Also, investments in first-time funds are highly unlikely due to the heavy emphasis placed on the proven ability of the entire investment team to work together to produce attractive returns, unless there is a compelling, attributable track record that was executed by the same team at a previous manager.
New capital commitments projected for fiscal 2019 will be focused on existing and prospective managers that have the clear potential to raise and manage funds that will be consistently strong performers in the categories listed in the following table. Projected commitments through 2018 include the four commitments in the June gray book. During fiscal 2019, it is anticipated that the category allocations will generally stay within the percentage ranges shown in the right hand column.

<table>
<thead>
<tr>
<th>ACTIVE COMMITMENTS BY CATEGORY</th>
<th>Projected Commitments through Fiscal 2018</th>
<th>Projected Allocation Ranges Fiscal 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Private Equity Funds</td>
<td>$ 9.6 billion (65%)</td>
<td>60%–70%</td>
</tr>
<tr>
<td>Domestic Venture Capital Funds</td>
<td>$ 3.0 billion (21%)</td>
<td>15%–25%</td>
</tr>
<tr>
<td>Global/International Private Equity Funds</td>
<td>$ 2.0 billion (14%)</td>
<td>10%–20%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$14.6 billion</strong></td>
<td></td>
</tr>
</tbody>
</table>

Private equity investment opportunities involve a long-term investment horizon, illiquidity, and high volatility of returns. For these reasons, expected financial returns should exceed those of the liquid asset classes. In private equity, returns on individual funds generally follow a pattern referred to as the “J-curve,” which anticipates negative returns during the early years of the fund, caused by the payment of management fees charged on committed capital and early write-downs, followed by progressively increasing positive returns thereafter as portfolio companies mature and then are exited.

The fiscal 2018 year-to-date performance through April for the total private equity portfolio was 15.8%. For fiscal 2019, the projected one-year return for the private equity portfolio is in the 7% to 10% range, which is “at” its long-term absolute return objective of 8.15% (net of fees) as established in the 2017 asset-liability study.

Continued progress was made on the general goals outlined in the fiscal 2018 annual investment plan by accessing oversubscribed high-performing funds and liquidating $59 million of public shares held in the stock distribution portfolio during the twelve months ended April 30, 2018, at prices above their distribution prices. Good success was achieved in furthering our efforts to access co-investment opportunities by making three new co-investment fund commitments during fiscal 2018. With respect to the fee transparency, we did make progress on that goal and expect to complete it in fiscal 2019.

During fiscal 2019, staff will:

- Continue to evaluate successor and new fund opportunities to improve the overall return potential of the portfolio;
- Continue to seek relationships with managers whose funds are difficult to access;
- Continuously opportunistically sell public shares distributed to us by the general partners;
- Further develop our process for properly collecting and tracking the information related to fee transparency; and
- Whenever possible, seek to make co-investments directly or through commingled funds and seek to make investments that share in general partner economics.
10. Alternative Investments — Opportunistic/Diversified

The opportunistic/diversified (OD) allocation within alternative investments was established in 2009, growing steadily from an initial allocation of 1% and will eventually reach the 10% target allocation established by the fiscal 2017 asset-liability study. The total OD market value shown below represents 8.1% of total fund, which is slightly above the current target allocation of 8%. The target will increase to 9% on 10/1/18 and to 10% on 7/1/19. The OD allocation is open to a wide variety of investment types sourced from all asset classes, both liquid and illiquid. The goal of the OD allocation is to earn equity-like returns net of fees over the long term, but with downside protection during equity bear markets.

Investment activity falls within the eight separate strategies shown in the Portfolio Summary below, including a new theme: Co-Investment & Direct Investments, each of which is subject to the market value maximum shown in the right-hand column. The dollar amounts of the active commitments within each strategy are shown along with their market values as of April 30, 2018.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>$ Committed</th>
<th>$ Market Value</th>
<th>$ Market Value Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banking, Insurance and Asset Management</td>
<td>$1,179</td>
<td>$812</td>
<td>$1,250</td>
</tr>
<tr>
<td>Co-Investment &amp; Direct Investments</td>
<td>-</td>
<td>-</td>
<td>$1,000</td>
</tr>
<tr>
<td>Energy &amp; Natural Resources</td>
<td>$1,044</td>
<td>$736</td>
<td>$1,500</td>
</tr>
<tr>
<td>Hedge Funds</td>
<td>$1,575</td>
<td>$1,662</td>
<td>$2,600</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>$100</td>
<td>$68</td>
<td>$250</td>
</tr>
<tr>
<td>Liquid Alternatives</td>
<td>$2,150</td>
<td>$1,319</td>
<td>$2,500</td>
</tr>
<tr>
<td>Public-Private Investment Funds</td>
<td>$113</td>
<td>$9</td>
<td>$100</td>
</tr>
<tr>
<td>Specialty Finance</td>
<td>$3,832</td>
<td>$1,683</td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$9,993</strong></td>
<td><strong>$6,289</strong></td>
<td><strong>$11,700</strong></td>
</tr>
</tbody>
</table>

The OD investment vehicles range from direct investments in public or private companies, separately managed accounts, investments in and alongside commingled partnership funds, including secondaries and co-investments, and hedged or liquid alternative investments in commingled funds, separately managed accounts, or internally designed vehicles.

A team of six senior members of the investment staff representing the major asset classes, including portfolio managers and asset class directors, is responsible for recommending themes, along with their market value maximums, and reviewing and approving prospective investment opportunities prior to them being presented to the investment committee for final approval. The staff that has day-to-day responsibility for the OD portfolio includes two co-portfolio managers and five investment professionals.

The OD portfolio has built a significant number of strong relationships with sophisticated, well-respected managers that provide us access to unique, high quality sourcing opportunities. These relationships play a key role in achieving the strategic initiative of growing the OD portfolio. Increasing
the allocation from 8% to 10% over the next year requires an estimated commitment pace of $1.5 to $2.5 billion. We anticipate contributions will be greater than distributions during fiscal 2019 due to increased investment activity in the prior fiscal year.

- Broadly, the investment plan contemplates an expected commitment pace of $800 million to $1 billion each year in less liquid and longer-term opportunistic investments, which will fund over several years. During the fiscal year, we anticipate making additional commitments within the Specialty Finance theme, which includes private debt, distressed, and special situations, and opportunistically across the remaining 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, two of the Market Value Maximums were increased in the table on the previous page: The Specialty Finance theme was increased to $2.5 billion from $2 billion and the Banking, Insurance and Asset Management theme was increased to $1.25 billion from $1 billion.

- Separately, liquid alternative investments will play a key role in meeting the investment objectives during the next 12 months, with investments expected to range from $350 to $750 million. Liquid alternative investments are typically funded upfront and have an immediate impact on the OD market value. During the fiscal year we anticipate adding to existing liquid alternative investments and initiating new investments in alternative risk premia and hedge fund alternatives. These investments are expected to increase liquidity, diversification, and risk-adjusted returns. We also anticipate rebalancing the Hedge Fund portfolio with the goal of improving returns, liquidity, and the risk profile of the portfolio.

- STRS Ohio attracted two additional investment professionals who will be dedicated to the establishment of a co-investment and direct investment portfolio. Therefore, a Co-Investment & Direct Investments theme has been added to the table on the previous page with an initial Market Value Maximum of $1 billion. The co-investment theme is expected to begin with a commitment pace of $100 to $250 million during fiscal 2019. It is expected that the majority of co-investments will be originated from existing manager relationships and include investment structures ranging from debt to equity.

Fiscal 2018 year-to-date performance through April is 7.4%. For fiscal 2019, the projected one-year return for the OD portfolio is in the 5% to 8% range, which is “at” its long-term absolute return objective of 6.35% (net of fees) as determined by the fiscal 2017 asset-liability study.

**Alternative Investments**

For the alternative investments asset class, which combines the private equity portfolio discussed in the previous section and the opportunistic/diversified portfolio discussed above, the fiscal 2018 year-to-date performance through April is 11.5%, compared to 7.7% last fiscal year through April. The projected one-year return for the alternative investment asset class for fiscal 2019 is in the 6% to 9% range, which is “at” its long-term absolute return objective of 7.09% (net of fees) based on the fiscal 2017 asset-liability study.