

Long-Term Investment Pool & Similar Funds (LTIP)

Investment Review for Calendar 2015

Submitted March 2016

This cover page provides a summary overview of the Pennsylvania State University Long-Term Investment Pool (LTIP) for Calendar Year 2015. The second page summarizes LTIP-related data that is discussed in detail on the remaining pages, along with performance analysis.

Executive Overview

Long-Term Investment Pool (LTIP) Performance

Annualized *net* investment returns for the Penn State University LTIP (adjusted for the impact of gifts and spending, and after external investment management expenses) for periods ending December 31, 2015 are:

| <u>Calendar 15</u> | <u>3 Years</u> | <u>5 Years</u> | <u>10 Years</u> |
|--------------------|----------------|----------------|-----------------|
| 1.1% | 7.5% | 8.0% | 6.8% |

Long-Term Investment Pool Market Value (pg 3)

As of December 31, 2015, Penn State University's LTIP was valued at \$3.63 billion, which includes \$2.34 billion in endowment assets and \$1.29 billion in non-endowed funds. An additional \$115 million was held as Similar Funds (see page 2 for details). Endowment spending is reviewed on pages 2 and 3.

Review of Investment Markets (pg 4)

The graph below compares respective returns for the 12-months ending December 31, 2015 and December 31, 2014 for the S&P 500, MSCI All Country World (ACWI) ex-US, Dow Jones UBS Commodities, Barclays Aggregate Bonds, and publicly-traded Real Estate Investment Trusts (REITs) Indexes. As shown below, investment market returns for Calendar 2015 lagged respective returns for December 31, 2014.

Investment Diversification and Asset Mix (pg 5)

At calendar year-end, 47% of LTIP assets were invested in public equities (domestic and foreign) and 16% in private equity and venture capital, in combination representing 63% of LTIP in growth-oriented assets. In addition, 20% was invested in fixed income/cash, 9% in real assets, and 8% in diversifying (hedged) strategies.

Comparative Fund Performance (pg 6)

Penn State's LTIP returned 1.1% net for the year ending December 31, 2015, surpassing the -0.2% return of the Passive Policy Portfolio, while LTIP's 3-yr and 5-yr relative performance was notably better than the respective passive benchmark returns.

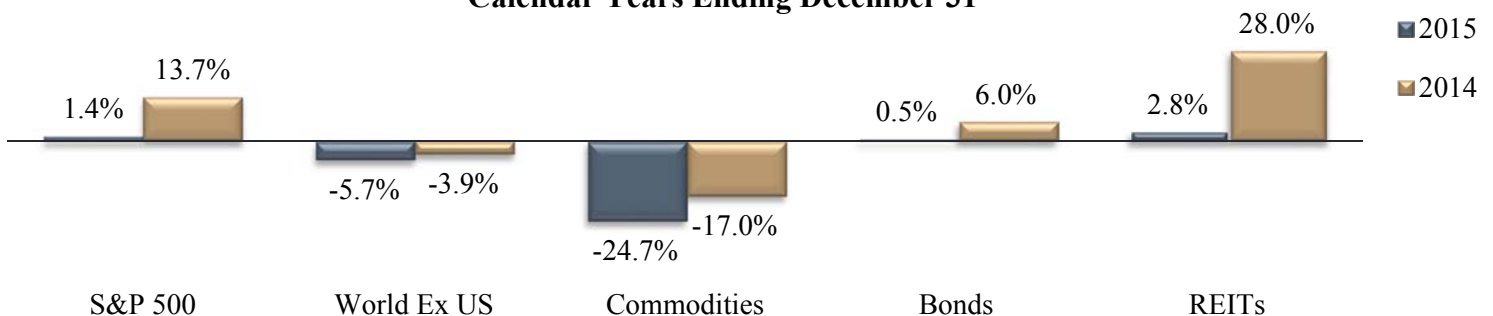
LTIP Liquidity (pg 7)

With nearly one-half of assets convertible to cash in a matter of days, the LTIP maintains adequate liquidity to satisfy anticipated cash requirements.

LTIP Performance and Spending (pg 8)

LTIP's average annual net returns of 6.8% and 8.0% for the last 10- and 20-year periods, respectively, have enabled LTIP to attain inflation-adjusted returns in excess of spending, achieving long-term intergenerational equity.

**Investment Market Returns
Calendar Years Ending December 31**



5-Year LTIP Facts and Figures

| | <u>2015</u> | Annual Periods Ending December 31 | | | <u>2011</u> |
|---|----------------|-----------------------------------|----------------|--------------|--------------|
| | <u>2015</u> | <u>2014</u> | <u>2013</u> | <u>2012</u> | <u>2011</u> |
| <i>Investment Performance</i> | | | | | |
| Endowment ¹ (annualized net returns) | 1.1% | 7.6% | 14.2% | 14.0% | 3.9% |
| <i>Market Values</i> (\$ millions) | | | | | |
| Endowment ¹ | 2,340.3 | 2,310.1 | 2,120.7 | 1,859.0 | 1,669.1 |
| <u>Similar Funds</u> ² | <u>115.2</u> | <u>108.3</u> | <u>109.7</u> | <u>94.3</u> | <u>89.7</u> |
| Endowment and Similar Funds | 2,455.5 | 2,418.4 | 2,230.4 | 1,953.3 | 1758.8 |
| Gifts & Other Additions (\$ mils) | 122.4 | 120.1 | 87.3 | 52.6 | 139.1 |
| Annual Spending (\$ mils) | 95.1 | 79.6 | 73.1 | 71.2 | 66.4 |
| <u>Non-Endowed Funds</u> ³ | <u>1,286.8</u> | <u>1,121.3</u> | <u>1,081.0</u> | <u>717.3</u> | <u>134.8</u> |
| Total LTIP ⁴ & Similar Funds | 3,742.3 | 3,539.7 | 3,311.4 | 2,670.6 | 1,893.6 |
| 1) Endowment — donor-restricted gifts | | | | | |
| 2) Similar Funds — deferred gifts and donor-restricted funds in transit to Endowment | | | | | |
| 3) Non-Endowed Funds earmarked for FAS 106 liability (employee post-retirement health care benefits) & President's Strategic Initiative Fund. These funds were phased in between 2009 and 2015. | | | | | |
| 4) Commingled assets over which Penn State's Office of Investment Management (OIM) has investment responsibility, as approved by the Penn State Investment Council (PSIC), exclusive of Similar Funds | | | | | |

Penn State Investment Council (PSIC) Fund Approvals

August 21 2015:

- Committing \$15M to: Private equity LP focused on growth state and mid-market technology companies
- Committing \$10M to: Early-stage venture LP

October 30, 2015:

- Investing \$60M in: Global healthcare equity
- Investing \$20M in: Emerging / frontier equity
- Committing \$20M to: Private equity / buyout LP focused on defense and aerospace

November 17, 2015:

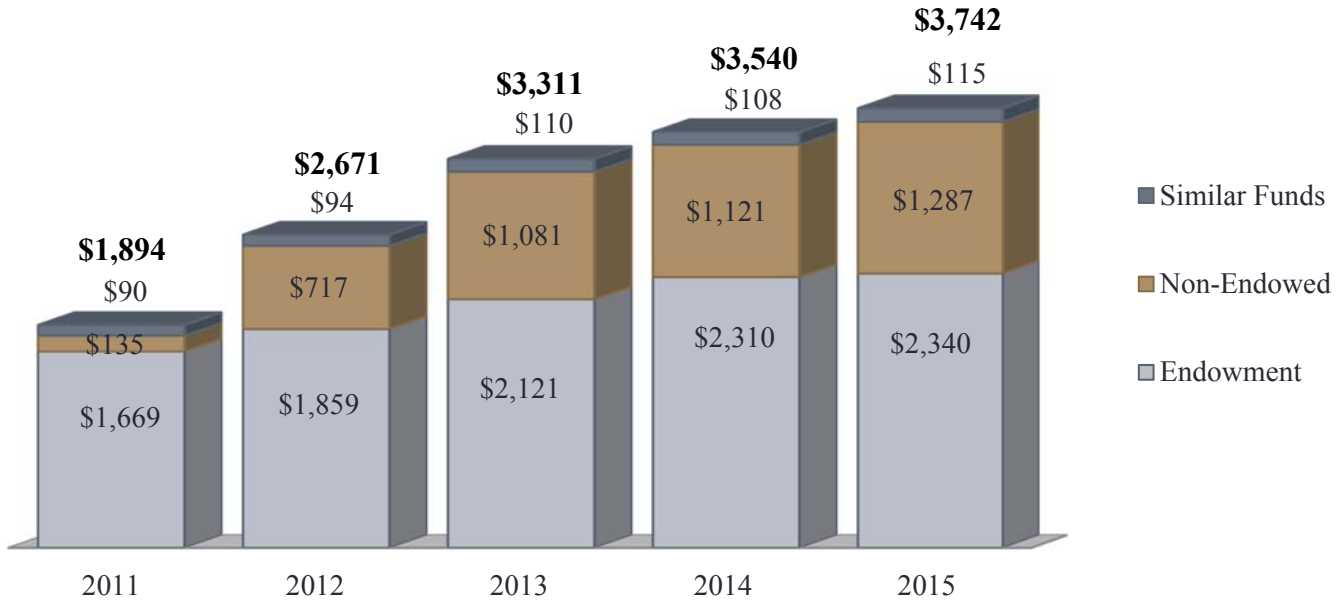
- Committing \$15M to: Private equity LP focused on growth stage and mid-market technology companies

Please note that commitments made to Limited Partnerships (LPs) are not immediately invested and are called (paid in) over several years until commitment is satisfied, except as noted.

Long-Term Investment Pool Market Value

As of December 31, 2015, Penn State’s Long-Term Investment Pool was valued at \$3.63 billion, including non-endowed funds in the amount of \$1.29 billion that have been commingled into the LTIP. Non-pooled assets — charitable remainder trusts, charitable gift annuities, and other life income funds in addition to donor restricted funds — accounted for an additional \$115 million, shown below as Similar Funds, for a total \$3.74 billion in assets.

Long-Term Investment Pool Market Value
Calendar Years Ending December 31
 (\$ millions)



Endowment Assets

Endowment assets increased by \$30.2 million during calendar 2015, from \$2.31 billion to \$2.34 billion. As seen in the table on page 2, endowed gifts added over the last 12 months totaled \$122 million, while endowment program support (spending) amounted to \$95 million. Current endowment spending has been approved by the Board of Trustees to remain at an annual rate of 4.5%.

Long-Term Investment Pool

Excluding \$115 million in similar funds that are managed externally, the market value of the Long-Term Investment Pool (LTIP) totaled \$3.63 billion, as of December 31, 2015. In addition to endowment assets of \$2.34 billion, LTIP includes \$1.29 billion in non-endowed assets that have been commingled for investment purposes, but are restricted to the on-going funding of the University’s FAS 106 liability.

The remainder of this report will focus on the Long-Term Investment Pool, including all commingled funds.

Review of Investment Markets in Calendar 2015

In the table below, representative financial market returns are listed for 1-, 3-, and 5-year periods covering four major asset categories: Global Equities (divided into US Equities and Non-US Equities), Fixed Income, Commodities, and Private Capital. The performance of investment markets that impact Penn State University's Long-Term Investment Pool (LTIP) is discussed below.

| <i>Annualized Percentage Returns as of December 31, 2015</i> | <u>1 Year</u> | <u>3 Year</u> | <u>5 Year</u> |
|--|---------------|---------------|---------------|
| Global Equities U.S. | | | |
| S&P 500 Index (US Large Cap Equities) | 1.4 | 15.1 | 12.6 |
| Russell 3000 Index (Total US Equities) | 0.5 | 14.7 | 12.2 |
| Russell 2000 Index (US Small Cap Equities) | -4.4 | 11.7 | 9.2 |
| Global Equities Non-U.S. | | | |
| MSCI All Country Ex-U.S. Index (ACWI) | -5.7 | 1.5 | 1.1 |
| MSCI Developed Non-U.S. Index (EAFE) | -0.8 | 5.0 | 3.6 |
| MSCI Emerging Markets Index (EME) | -14.9 | -6.8 | -4.8 |
| Fixed Income | | | |
| Barclays US Aggregate Bond Index | 0.5 | 1.4 | 3.2 |
| Barclays US Treasury TIPS Bond Index | -1.4 | -2.3 | 2.5 |
| JP Morgan Global Bond Index | -3.6 | -2.7 | -0.1 |
| Commodities | | | |
| Bloomberg Commodities Index | -24.7 | -17.3 | -13.5 |
| Gold (SPDR GLD) | -10.6 | -14.4 | -5.8 |
| Private Capital (9/30/15) | | | |
| Venture Capital (Cambridge Associates) | 21.3 | 20.2 | 17.6 |
| Private Equity (Cambridge Associates) | 5.9 | 13.6 | 14.3 |
| Private Real Estate (NCREIF) | 13.5 | 11.9 | 12.5 |

Market Notes:

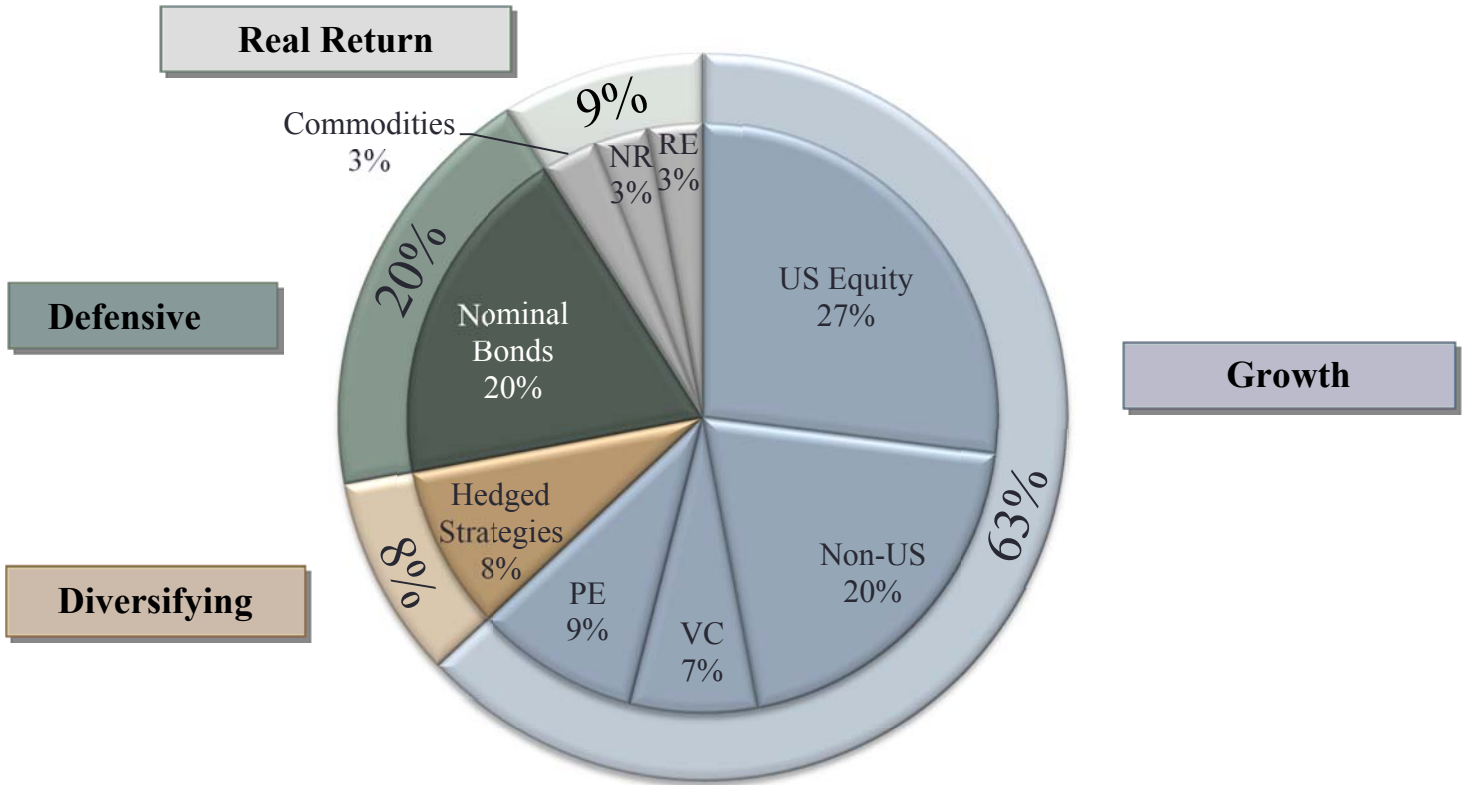
- **Global Equities:** Except for Small Cap, US Equities recorded single-digit advances for the calendar year ended December 31, 2015, with stronger double-digit returns for the 3-, and 5-year periods. US Equities continued to outpace non-US Equities over all three periods. Non-US Equities in total were down -5.7% in calendar 2015, with Developed Markets, EAFE, returning -0.8% and Emerging Market Equities, EME, returning -14.9%.
- **Fixed Income:** US Aggregate Fixed Income continued a pace of modest, positive gains while US TIPS were slightly negative, -1.4%, and Global Bonds declined -3.6%, in calendar 2015.
- **Commodities:** The Bloomberg Commodities Index continued its negative trend, registering losses of -24.7%, -17.3%, and -13.5% for the trailing 1-, 3-, 5-years, while Gold's -10.6% return outpaced commodities overall.
- **Private Capital:** Private Equity, Venture Capital, and Private Real Estate continued their double-digit gains for each of the 1-, 3-, 5-year periods ending 9/30/2015, which is the latest reporting period for non-marketable investments.

Economic and Market Outlook

On the following two pages, LTIP's broad and detailed asset mix is discussed, followed by the composite investment returns for each of the four above asset categories compared to the corresponding LTIP returns.

Investment Diversification and Asset Mix

Asset allocation is a primary determinant of investment performance and risk control. LTIP's asset mix combines four strategic investment themes – growth (economic-sensitive), diversifying (low sensitivity to economic/investment market fluctuations), real (inflation-sensitive), and defensive (counter-sensitive to market turbulence) – to maximize potential returns, while tempering volatility. In the graph below, the four macro investment themes are shown in the outermost ring with their December 31, 2015 allocations of 63%, 8%, 9%, and 20%, respectively. Over time, the percentages vary depending on market trends and allocations approved by the Penn State Investment Council.



At a more granular level, LTIP's diversified portfolio includes a variety of traditional asset classes that comprise the four strategic themes, as shown by the slices within the inner pie (percentages are rounded):

- Growth (63%): 27% in publicly-traded US and 20% in publicly-traded non-US common stocks, as well as 7% in venture capital (VC), and 9% in private equity (PE) funds.
- Diversifying (8%): 5% in credit-related, and 3% in equity-related strategies.
- Defensive (20%): 5% in investment grade bonds, 4% in global bonds, and 11% in short-term investments.
- Real Return (9%): 3% in real estate (RE), 3% in natural resources (NR), and 3% in commodities.

The above grouping by investment themes provides insight to the functional role of the various asset classes within LTIP. The relative allocations represent comparative long-term return expectations, tempered by risk-mitigating assets to offset capital market turbulence. Hence, the approximately 63% currently allocated to growth is intended to take advantage of the capital appreciation and purchasing power protection historically offered by higher returning equity investments. Given the sometimes volatile nature of equity returns, 20% is invested in defensive (fixed income) and 8% in various hedged strategies to provide stability and diversification during times of market turbulence and uncertain economic conditions. In addition, 9% of LTIP is allocated to real return in order to help neutralize inflationary episodes.

LTIP Performance Compared to Passive Portfolio

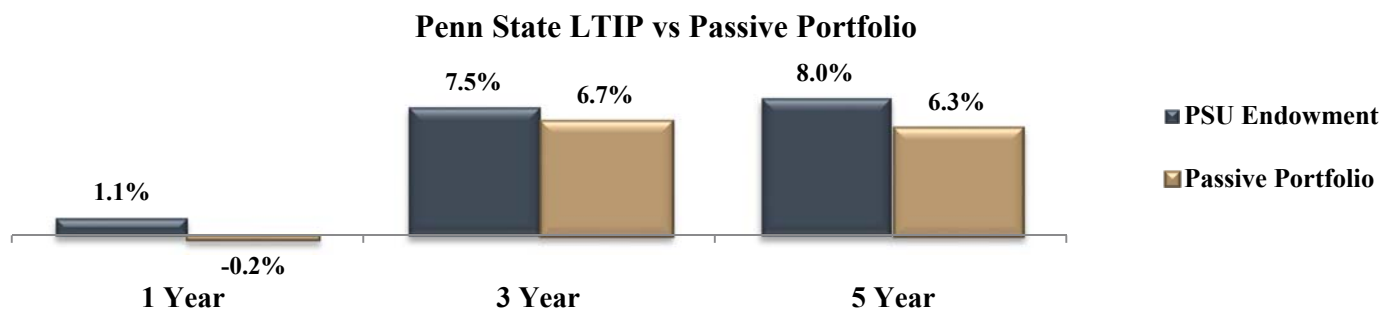
The Long-Term Investment Pool’s investment performance is measured against a hypothetical *Passive Portfolio*, comprised of four broad asset categories: Public Equities, Private Capital, Fixed Income and Commodities. This passive portfolio serves as a blended benchmark against which the performance of the actual, actively-managed, and more broadly-diversified LTIP portfolio is monitored. This analysis is distinct from the foregoing conceptual, strategic themes which do not lend themselves to benchmarks analysis.

These categories are very broadly defined: the equity and fixed income categories include hedge funds whose strategies are equity and/or credit oriented, respectively, while commodities include hedged and long-only strategies. The custom index for Private Capital includes representative private equity, venture capital, and private real estate partnership time-weighted returns.

In the table below, the respective static weightings of the four asset categories are associated with corresponding market benchmarks and their respective index returns to generate *Passive Portfolio* returns over 1-, 3-, and 5-year horizons:

| <u>Asset Class</u> | <u>Benchmark</u> | <u>Weighting</u> | <u>Annualized Benchmark Returns</u> | | |
|--------------------------------------|-------------------------------|------------------|-------------------------------------|----------------|----------------|
| | | | <u>1 Year</u> | <u>3 Years</u> | <u>5 Years</u> |
| Public Equities | MSCI All Country World | 55% | -2.4 | 7.7 | 6.1 |
| Total Private Capital | Custom Index | 20 | 11.0 | 15.2 | 14.7 |
| Fixed Income | Barclays Aggregate Bond Index | 20 | 0.5 | 1.4 | 3.2 |
| Commodities | Dow Jones UBS Commodities | 5 | -24.7 | -17.3 | -13.5 |
| Total Passive Portfolio (net) | | 100% | -0.2% | 6.7% | 6.3% |

Note: The weightings used above are assumed to be constant over the entire 5-yr.

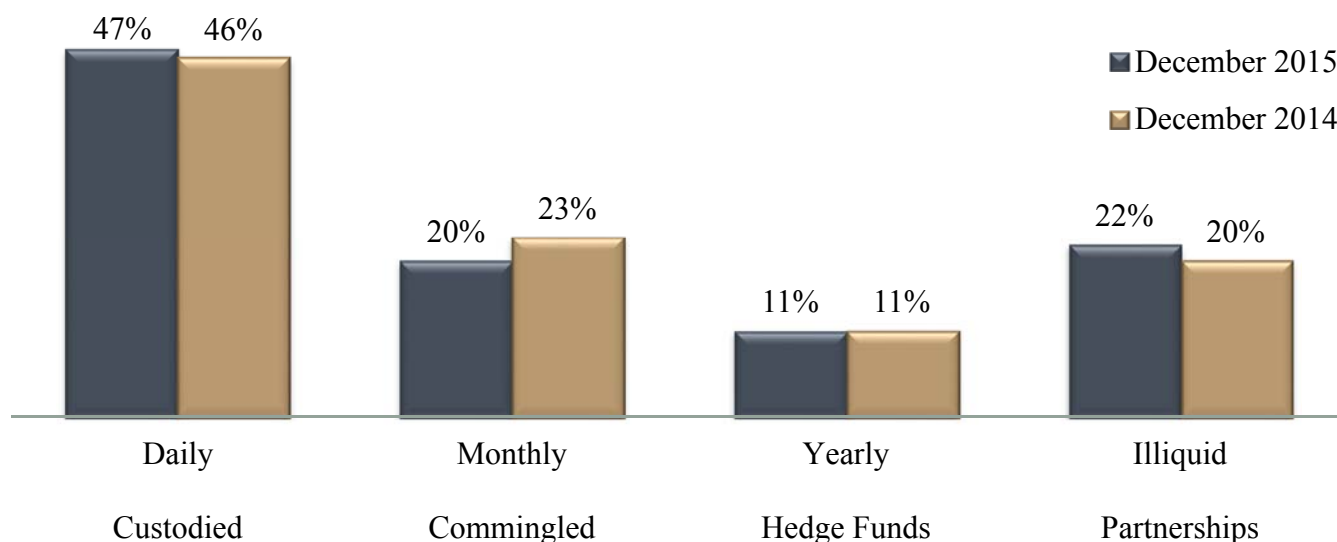


As shown above, Penn State’s LTIP returned 1.1% net for calendar 2015, surpassing the -0.2% return of the Passive Portfolio over the trailing 12 months. For the 3- and 5-year periods, the Long-Term Investment Pool’s annualized returns of 7.5% and 8.0% outpaced the Passive Portfolio’s returns of 6.7% and 6.3%, respectively. These returns indicate that, over the long term, LTIP was able to outperform passive indexes through selection of active investment managers and broad diversification of assets as shown on the previous page.

The Passive Portfolio provides a guidepost to help achieve long-term results that are consistent with the twin objectives of purchasing-power preservation, along with stable LTIP spending. LTIP’s performance varies from the *static* Passive Portfolio as a consequence of several factors, including, but not limited to, the timing of cash-flows, tactical shifts in asset mix, and individual investment manager performance and turnover.

Long-Term Investment Pool Liquidity

Financial crises are characterized, among other considerations, by lack of liquidity, as institutions are unable to meet current obligations due to lack of available cash. In the graph below, LTIP assets are classified according to how quickly they can be converted to cash. Securities listed on exchanges or traded over-the-counter, and held in custody as separately managed accounts, can be liquidated on a daily basis (typically 1- and 3-day settlement for bonds and stocks, respectively). Commingled portfolios, i.e., collectively-managed investment pools of publicly-traded securities, are eligible for purchase or sale at least once a month. Hedge fund partnerships are typically open for at least partial liquidation once a year, with a few having more and/or less frequent liquidity “windows.” Non-marketable partnerships are considered illiquid primarily because of the inability of limited partner investors to transact at will.



Observations from the blue (left) bars of each of the four pairs above for the period ending December 31, 2015:

- 47% percent of LTIP assets are invested in stocks and bonds that can be converted to cash in a matter of days. Of this, 11% is currently held in money market accounts and short-term fixed income investments.
- Commingled portfolios, primarily non-US public equities, comprise 20% of LTIP assets and can be converted to cash within 30 days or, in some cases, sooner. Commingled investment structures are used for non-US holdings in lieu of registering in individual countries where foreign companies are headquartered.
- 11% of LTIP assets are invested in various diversifying hedge fund partnerships and can be at least partially converted to cash annually or, in many cases, quarterly.
- 22% percent of LTIP assets are invested in more than 100 different partnership funds or other non-marketable investments that are considered illiquid because underlying holdings are typically not readily marketable or the timing of future realizations into cash distributions are uncertain.

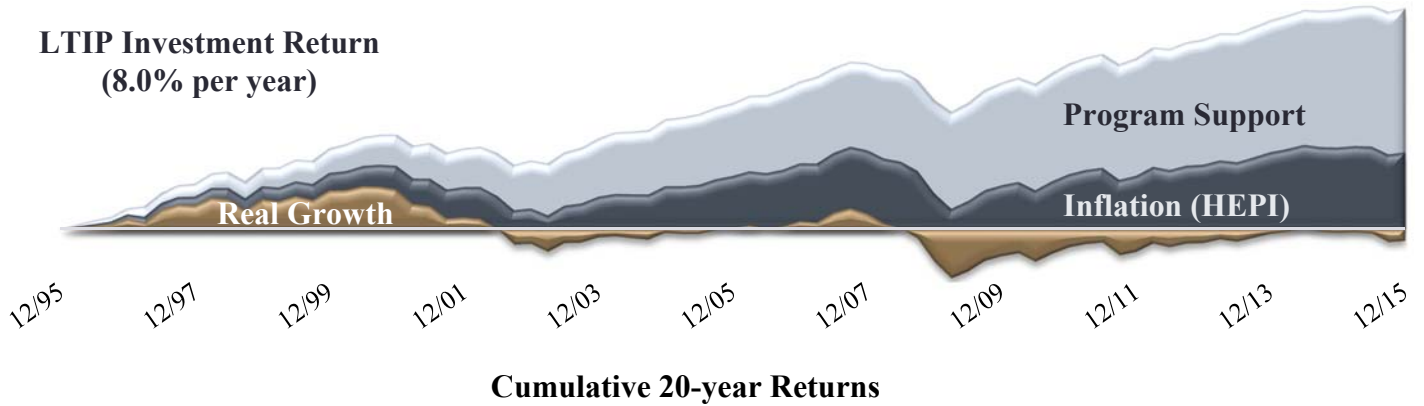
The foregoing indicates that LTIP maintains sufficient liquidity to satisfy anticipated cash requirements.

Liquidity Trends

As shown above, the liquidity profile of Penn State’s LTIP has shifted somewhat from the end of calendar 2014 (tan bars) to the end of calendar 2015 (blue bars). Daily liquidity rose slightly to 47% with increased short-term investments, while monthly liquidity decreased from 23% to 20%. Yearly liquidity remained at 11%, while illiquid non-marketable alternative assets increased from 20% to 22%. Over time, stepped up commitments to partnerships will gradually result in larger representation by non-marketable investments.

Long-Term LTIP Growth and Spending

In the chart below, the top line represents the cumulative net investment return of the Penn State Long-Term Investment Pool (LTIP) over the last 20 years, averaging 8.0% per year. The layers illustrate investment return apportioned to program support (spending, as previously discussed on pages 2 and 3) and inflation (as measured by the Higher Education Price Index [HEPI]), with the remaining residual representing net, real (inflation-adjusted) growth.



LTIP’s primary investment goal is to earn a long-term rate of return sufficient to support *current* spending and to preserve *future* purchasing power. This two-pronged objective is illustrated by apportioning total nominal (i.e., before adjusting for inflation) investment return (topmost line above) into discrete layers, representing program support and inflation, along with a residual layer corresponding to net *real* growth.

Because investment returns periodically fluctuate (illustrated by the jagged topography above), real growth, which nets out program support and inflation from total LTIP return, oscillates across the horizontal “intergenerational equity” line. While market fluctuations have caused the growth layer to swing positive and negative around the horizontal line, intergenerational equity has largely been achieved.

20 Years of LTIP Growth Relative to Equities and Bonds

The top line of the chart above, representing the growth of \$1 compounded at LTIP’s average annual return of 8.0% for 20 years ending 12/31/2015, is compared in the chart below (LTIP- thick blue line) to the same period returns for the S&P 500 Index (S&P 500- green line) and Barclays Aggregate Bonds (BAGG- brown line).

As shown, the 20-year cumulative growth for LTIP’s diversified portfolio has essentially matched that of the S&P 500 Index with less-pronounced oscillations, indicating LTIP was less volatile than equities over the same period. Both have clearly outpaced the growth of \$1 invested in bonds (BAGG). It is observed that LTIP would have outpaced any mix, within a balanced portfolio, of these representative index returns for equities and bonds over this time period.

