

Long-Term Investment Pool & Similar Funds (LTIP)

Investment Review for June 30, 2019

Executive Overview

June 30, 2019 LTIP Market Value (\$): **\$4,466,832,166**

Annualized investment returns, net of fees

	1 Year	3 Years	5 Years	10 Years	20 Years
LTIP	7.7%	9.3%	6.0%	9.8%	6.9%
Passive Benchmark	5.9%	8.8%	5.3%	8.6%	5.5%
Strategic Asset Allocation Benchmark	6.9%	9.4%	6.0%	9.3%	6.4%

Passive Benchmark: 70% MSCI ACWI IMI Index and 30% Bloomberg Barclays Aggregate Bond Index.

Strategic Asset Allocation Benchmark (SAB) is comprised of five broad asset categories: Public Equities (46%), Private Equity (20%), Fixed Income (10%), Diversifying (12%) and Real Assets (12%).

Long-Term Investment Pool Market Value

As of June 30, 2019, LTIP was valued at \$4.47 billion, which includes \$3.11 billion in endowment assets and \$1.36 billion in non-endowed funds. An additional \$138 million was held as similar funds.

Fund Performance

LTIP returned 7.7% net for the fiscal year ending June 30, 2019, comfortably outperforming both the Passive Benchmark as well as the Strategic Asset Allocation Benchmark. LTIP has consistently outperformed the Passive Benchmark over short, intermediate, and long-term time periods.

Average annual net returns of 9.8% and 6.9% over the last 10 and 20 years, respectively, have exceeded or approximated spending and inflation, thereby enabling LTIP to achieve long-term intergenerational equity.

Investment Diversification and Asset Mix

At fiscal year-end, 48% of LTIP assets were invested in public equities (domestic and foreign) and 21% in private equity and venture capital funds, for a combined 69% of LTIP representing growth-oriented assets. In addition, 11% was invested in fixed income/short-term investments, 7% in real assets, and 13% in diversifying/hedged/private credit strategies.

LTIP Liquidity

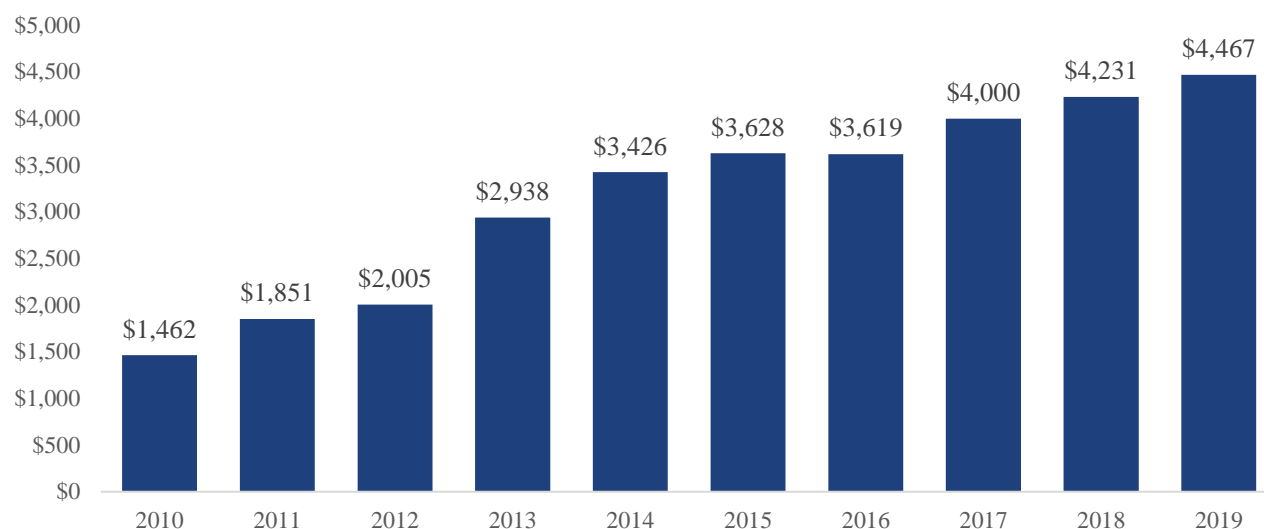
LTIP maintains adequate liquidity to satisfy anticipated cash requirements: 32% of assets can be converted into cash in a matter of days and 66% can be liquidated within 90 days.

Long-Term Investment Pool Report

Investment Review for June 30, 2019

Market Value – Fiscal Year

(\$ millions)



As of June 30, 2019, LTIP was valued at \$4.47 billion, including \$1.36 billion in non-endowed funds that have been commingled into the pool. Non-pooled assets — charitable remainder trusts, charitable gift annuities, and other life income funds in addition to donor restricted funds in transit — accounted for an additional \$138 million.

5-Year LTIP Facts and Figures

(\$ millions)

June 30	2015	2016	2017	2018	2019
Endowment ¹	2,375.7	2,347.4	2,624.5	2,851.6	3,108.1
Non-Endowed Funds ²	1,252.2	1,271.9	1,375.6	1,379.0	1,358.7
Total LTIP³	3,627.9	3,619.3	4,000.1	4,230.6	4,466.8
Similar Funds ⁴	115.9	123.7	133.1	139.0	137.7
Gifts & Other Additions	130.3	94.9	108.6	170.7	182.2
Program Spending	84.0	95.4	98.7	105.2	117.0
Non-Endowed Spending	42.3	45.5	46.5	46.5	48.1

1) Endowment — donor-restricted gifts

2) 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 2018.

3) LTIP — Commingled assets over which Penn State's Office of Investment Management (OIM) has investment responsibility, as approved by the Penn State Investment Council (PSIC)

4) Similar Funds — deferred gifts and donor-restricted funds in transit to Endowment

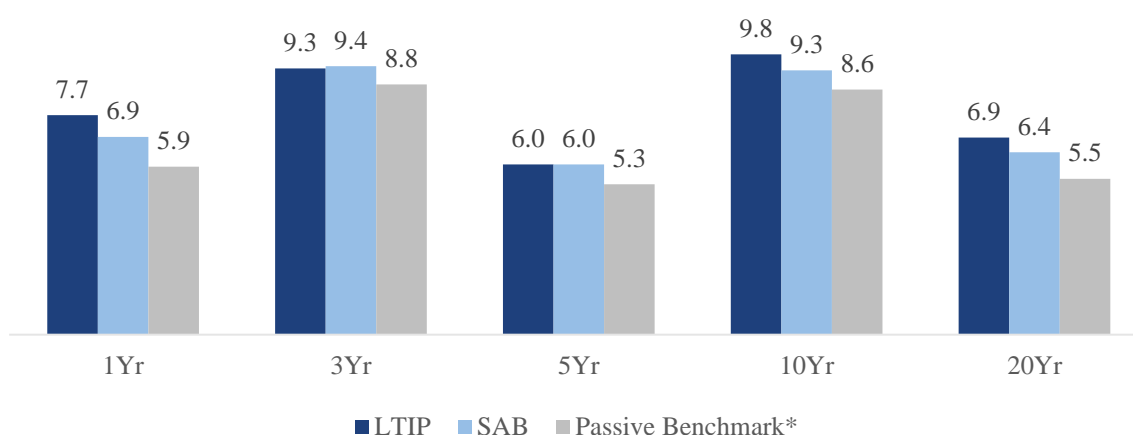
Endowment

Over the last 12 months, Penn State University's Endowment increased from \$2.85 billion to \$3.11 billion. Gifts, including the President's Strategic Initiative Plan, added \$182 million to the Endowment, while program support (spending) subtracted \$117 million. Current endowment spending remains at 4.5%, as approved by the Penn State Investment Council, and the University's Board of Trustees.

Non-Endowed funds represented \$1.36 billion, comprised of \$1.25 billion in non-endowed assets that have been commingled for investment purposes but are dedicated to the ongoing funding of the University's FAS 106 liability and \$108 million for the President's Strategic Initiative Fund.

LTIP Performance – Annualized Returns

June 30, 2019



* 70% MSCI ACWI IMI Index, 30% Bloomberg Barclays US Aggregate

For the fiscal year ended June 30, 2019, LTIP returned 7.7% net, surpassing the Strategic Allocation Benchmark (SAB) as well as the Passive Benchmark returns of 6.9% and 5.9%, respectively. Strong investment returns generated by LTIP's private capital funds were the primary driver of outperformance relative to the benchmarks.

LTIP's investment performance is measured against a Strategic Asset Allocation Benchmark (SAB) that is comprised of public equities (46%), private equity (20%), fixed income (10%), diversifying & private credit (12%), and real assets (12%). This portfolio serves as a blended benchmark against which the performance of the actual, actively-managed, and broadly-diversified LTIP portfolio is monitored. LTIP's performance varies from the static SAB due to several factors including, but not limited to, the timing of cash-flows, tactical shifts in the asset mix, and individual investment manager performance and turnover. Additionally, SAB provides a guidepost to help achieve long-term results that are consistent with the twin objectives of purchasing-power preservation and stable LTIP spending.

LTIP Performance Summary continued

Penn State further categorizes asset classes into growth assets and defensive/diversifying/real assets. The growth assets are focused on return generation and include public and private equity. The other category focuses on capital preservation and diversification. Defensive-Diversifying-Real Assets include fixed income, diversifying strategies (including hedge funds and private credit), private real estate, and both public and private natural resources.

LTIP's performance is also measured against a Passive Benchmark, which is a blend of 70% MSCI ACWI IMI Index and 30% Bloomberg Barclays US Aggregate Bond Index. This benchmark serves as an easily replicable and liquid alternative to the actively managed LTIP portfolio.

In the table below, SAB returns are calculated by taking the respective static weightings of the five asset categories and their respective index returns over 1-, 3-, 5-, and 10-year horizons for the fiscal year ending June 30, 2019:

Asset Class	Benchmark	Annualized Strategic Allocation Benchmark Returns					LTIP Returns
		Weights	1 Year	3 Years	5 Years	10 Years	10 Year
Public Equities	MSCI ACWI IMI	46%	4.6%	11.4%	6.0%	10.3%	11.2%
Private Equity	Custom Index	20	14.0	13.6	12.0	14.0	20.3
Fixed Income	BB Agg Bond Index	10	7.9	2.3	2.9	3.9	3.4
Diversifying	BB Agg Bond Index	12	7.9	2.3	2.9	3.9	5.8
Real Assets	CPI + 300	12	4.8	5.1	4.5	4.7	3.4
Strategic Asset Allocation Benchmark		100%	6.9%	9.4%	6.0%	9.3%	
LTIP							9.8%

Note: The weightings used above are assumed to be constant over the calculation period.

Investment Market Returns

In the table below, representative financial market returns are listed for 1-, 3-, 5-, and 10-year periods including US equities, non-US equities, private equity, fixed income, diversifying and private credit, and real assets.

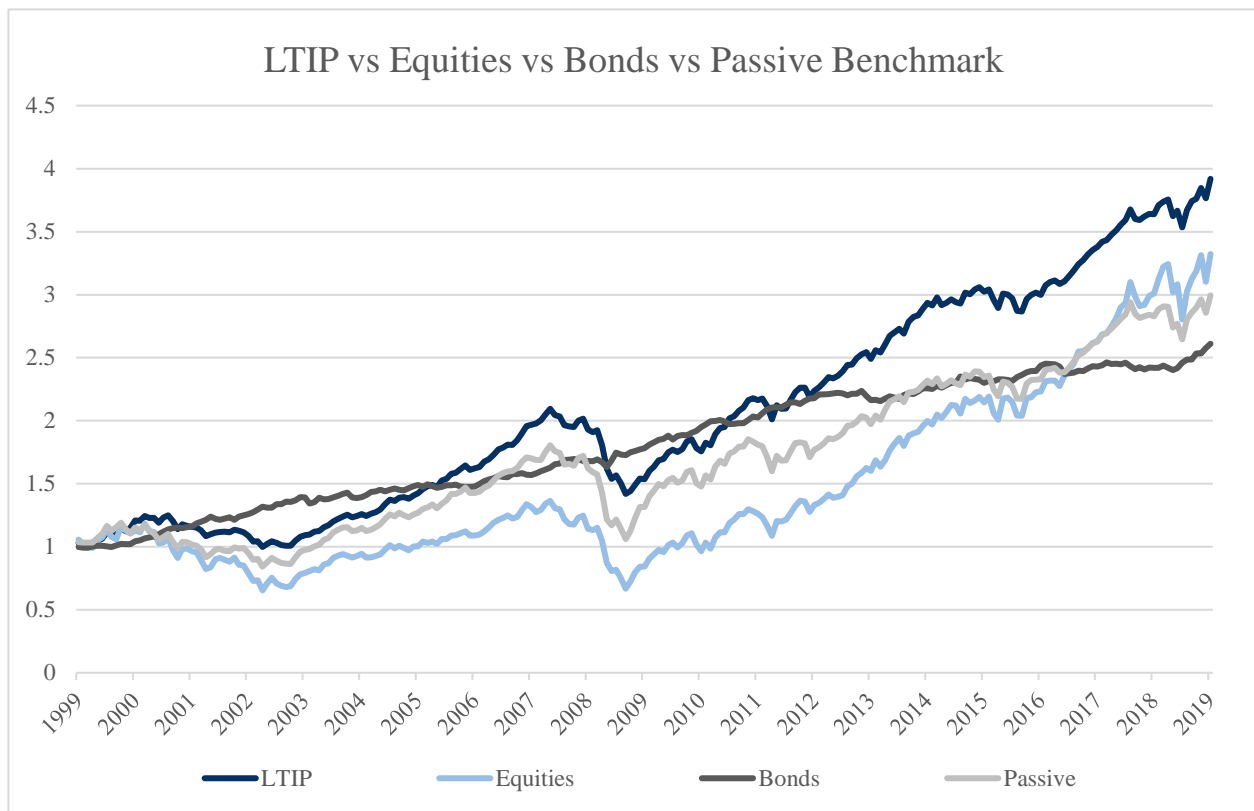
<i>Annualized Percentage Returns as of June 30, 2019</i>	1 Year	3 Years	5 Years	10 Years
US Equities				
S&P 500 Index (US Large Cap Equities)	10.4	14.2	10.7	14.7
Russell 3000 Index (Total US Equities)	9.0	14.0	10.2	14.7
Russell 2000 Index (US Small Cap Equities)	-3.3	12.3	7.1	13.4
Non-US Equities				
MSCI All Country World Ex-US Index (ACWI Ex-US)	1.3	9.4	2.2	6.5
MSCI Developed Non-US Index (EAFE)	1.1	9.1	2.2	6.9
MSCI Emerging Markets Index (EME)	1.2	10.7	2.5	5.8
Private Equity				
Venture Capital (Cambridge Associates)	20.7	13.6	13.2	13.8
Private Equity (Cambridge Associates)	7.5	13.5	10.8	14.1
Fixed Income				
Bloomberg Barclays US Aggregate Bond Index	7.9	2.3	2.9	3.9
Citigroup World Global Bond Index (WGBI)	5.5	1.0	0.8	2.2
Diversifying and Private Credit				
Bloomberg Barclays US Aggregate Bond Index	7.9	2.3	2.9	3.9
Private Debt (Cambridge Associates)	5.3	10.1	7.3	14.6
Real Assets				
Bloomberg Commodities Index	-6.8	-2.2	-9.1	-3.7
Bloomberg Gold Index	9.5	0.0	-0.2	3.1
Private Real Estate (Cambridge Associates)	3.8	8.5	9.7	8.1
Natural Resources (Cambridge Associates)	0.4	9.0	-0.2	5.5

Cambridge Associates returns as of March 31, 2019

Long Term LTIP Performance

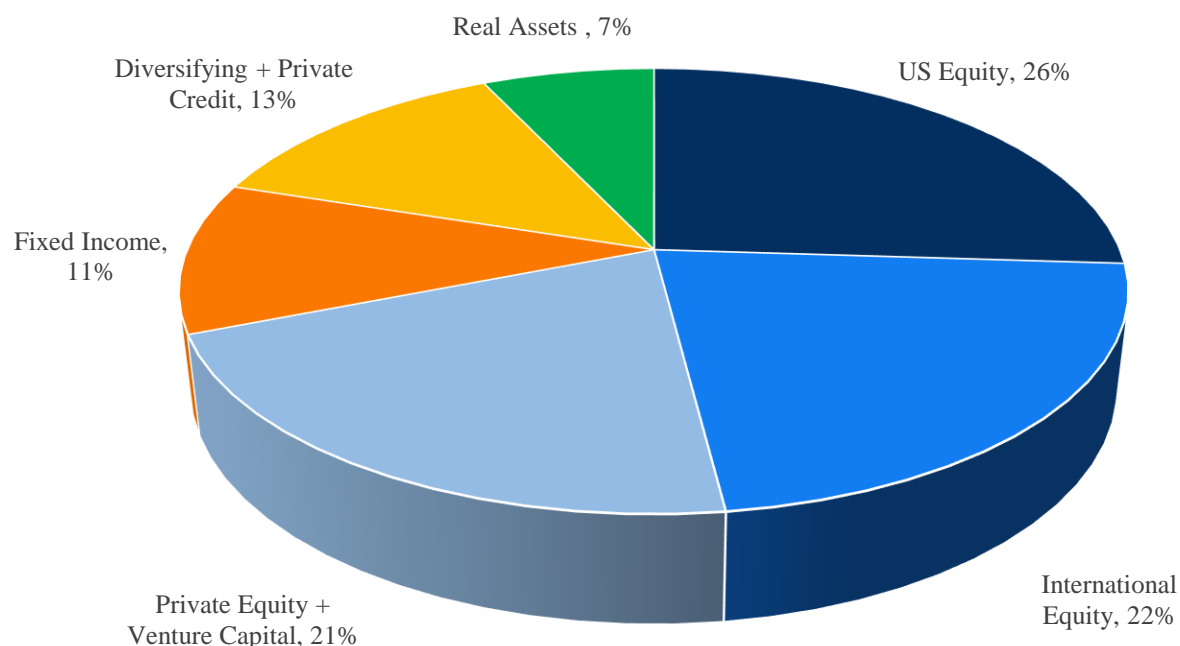
The chart below represents the growth of \$1 compounded using LTIP's average annual return of 6.9% for the 20 years ending June 30, 2019 and is compared to the returns for the S&P 500 Index, the Bloomberg Barclays Aggregate Bond Index, and the Passive Benchmark.

As shown, the 20-year cumulative growth for LTIP's diversified portfolio outperformed the S&P 500 with less-pronounced oscillations, indicating that LTIP was less volatile than equities over the same period. Both have outpaced the growth of \$1 invested in a diversified portfolio of bonds. LTIP's return also exceeded the blended return of a hypothetical passive balanced portfolio comprised of 70% equities and 30% bonds.



Investment Diversification and Asset Mix

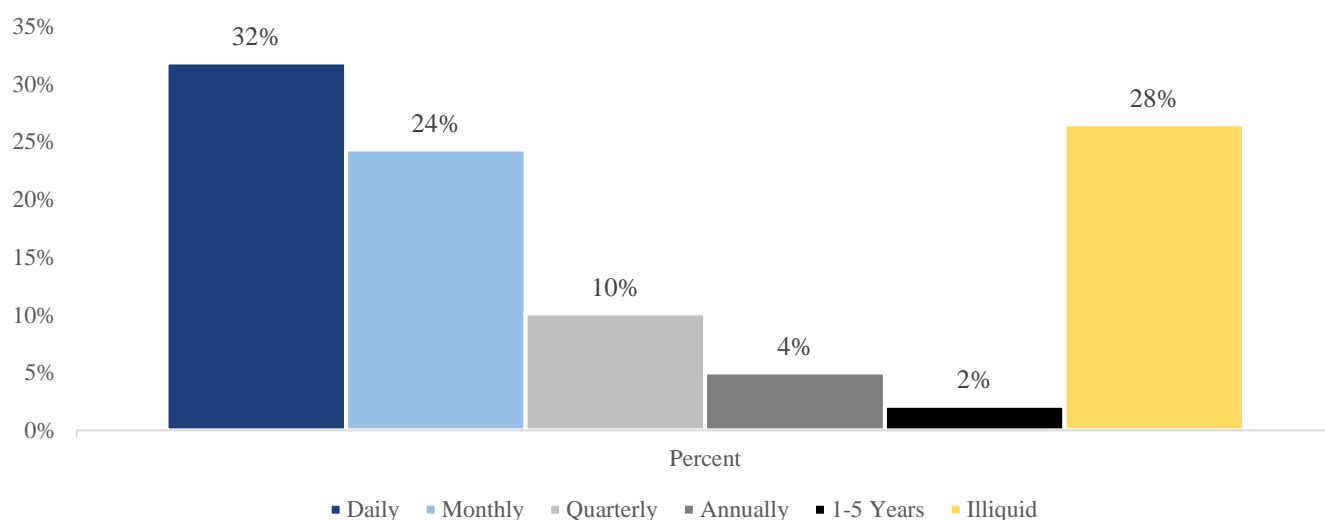
Asset allocation is a primary determinant of investment performance and risk control. LTIP's asset mix combines four strategic investment themes – growth (economic-sensitive), diversifying (low-sensitivity to economic / investment market fluctuations), real (inflation-sensitive), and defensive (counter-sensitive to market turbulence). These themes are intended to provide LTIP with a level of resilience during different market environments, while still allowing for an absolute return that enables the portfolio to achieve its return objectives. Approximately 69% of LTIP's current allocation to growth is intended to benefit from the capital appreciation and purchasing power protection historically offered by higher returning equity investments. Given the volatile nature of equity returns, 11% of LTIP is invested in defensive (fixed income) and 13% in various hedged and private credit strategies to provide stability and diversification during times of market turbulence and uncertain economic conditions. In addition, 7% of LTIP is allocated to the real return category to help mitigate inflationary episodes. The percentages are dynamic and vary depending on market trends and allocations approved by the Penn State Investment Council.



- Growth (69%): 26% in publicly-traded US and 22% in publicly-traded non-US common stocks; 10% in venture capital, and 11% in private equity funds.
- Defensive (11%): 3% investment grade bonds, 3% global investment grade bonds, and 5% short-term investments/cash.
- Diversifying & Private Credit (13%): 10% diversifying, and 3% private credit strategies.
- Real Return (7%): 1% private real estate, 3% natural resources, and 3% commodities.

Long-Term Investment Pool Liquidity

Financial crises are characterized, among other considerations, by a lack of liquidity, as institutions are unable to meet current obligations due to insufficient 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 above graph for the period ending June 30, 2019:

- Roughly 32% of LTIP assets are invested in stocks and bonds that can be converted to cash within days. Of this, 5% is currently held in money market accounts and short-term fixed income investments.
- Commingled funds house 24% of LTIP assets, which are primarily non-US public equities, and can be converted to cash monthly or, in some cases, sooner.
- Limited partnerships with hedge fund structures account for 14% of LTIP assets and can be at least partially converted to cash annually or, in many cases, quarterly. Approximately 2% of assets are invested in limited partnerships with an investment lock-up period of between one and five years.
- Illiquid investments represent 28% of LTIP assets and are invested in more than 180 different private partnerships or other non-marketable investments that are considered illiquid because underlying holdings are not readily marketable or the timing of future realizations into cash distributions is uncertain.