

PRIM Board Quarterly Update

THIRD QUARTER 2018

Markets Overview and PRIT Fund Performance Summary

PRIM Executive Director and Chief Investor Officer Michael G. Trotsky, CFA provided the following information to the PRIM Board at its November 29, 2018, meeting:

MARKETS OVERVIEW

In the first quarter, U.S. and developed international equity markets were weak, but emerging markets equities were up slightly. A 60/40 mix of global stocks and bonds was down 1.3% in Q1, but the PRIT Fund was up 0.6%. In Q2 stocks were strong in the U.S., but developed international stocks sold off sharply and diversified bonds were flat. In Q2, a 60/40 mix of global stocks and bonds was up 0.3% and the PRIT Fund again fared better and was up 1.1%. In Q3, US stocks were up 7.7%, developed international stocks up 1.4%, but emerging markets (EM) stocks continued their slide, and were down 1.1%. A 60/40 mix of global stocks and bonds was up 2.6% in Q3 and the PRIT Fund did slightly better with a return of 2.8%. All that considered, for the calendar year through September, a 60/40 mix of stocks and bonds was up only 1.7%, but the PRIT Fund was up 4.5%.

The fourth quarter has been weak, and volatility has returned – the volatility index, the VIX, spiked to more than 23 in November after reaching a low of 12 in September. The five-year average for the VIX is 14.8. October 2018 was the third worst month for the S&P 500 since the world financial crisis with the S&P down 6.8%. October 2018 was the worst month since September 2011 when the S&P was down more than 7%, which was one month before the US debt downgrade and amid concerns about the European debt crisis. The only other worse month was in May 2010 when the S&P was down 8% in the aftermath of the Flash Crash, caused by the first round of the European debt crisis.

It is interesting to note that the October 2018 downdraft was in part caused by another potential European debt crisis, the stand-off between Brussels (the EU) and Rome concerning Italy's dire fiscal situation. This adds to the brew of caution that we identified last quarter when we discussed the risks in the market and we compared the current economic picture to the markets of mid-2014 through early 2016, when we had another global economic slowdown that led to a correction in world financial markets. We observe some very similar market characteristics today. Namely, 1) Narrowing stock markets in both periods. The equity rebound in the first nine months of this year left many global markets, and many US sectors behind. 2) Liquidity issues. It became difficult to secure US dollars from outside the US in 2015. We note that global funding conditions are very tight for dollar funding today – same in 2015. 3) The economic situation today is vulnerable. We have been highlighting this for several quarters. On the surface, not much has changed: US GDP growth is growing at a 3.5% clip and the employment picture is bright, wages are finally rising and so, too is inflation. Until recently, the US Fed seemed intent on raising rates one more time this year and had penciled in three more rate increases for next year. But in late November, Chairman Powell indicated that the interest rates were near the “neutral level”, meaning current rates are neither stimulative or restrictive. We interpret that as meaning the three rate hikes penciled in for 2019 may not occur.

At the investment committee we explored the past four major market corrections since 2000 and we noted that all occurred with an economic slowdown or even a contraction. We highlighted some visible signs that global growth is slowing. While the U.S. is still posting solid GDP gains, Europe, China and Japan are slowing. But even in the US, manufacturing is weakening – a good economy has more than twice the

manufacturing production increase of the 0.2% posted in September. And with energy so weak, it will be difficult to achieve any significant increase in manufacturing production in the near term. GM shuttering five plants and laying off more than 14,000 workers is also troubling. Housing is weak, consumer confidence is eroding from an 18-year high, industrial material prices are weak and global dollar liquidity is tight. There were vulnerabilities in the global economy before there were tariffs. Tariffs and trade escalations are an additional negative for global growth. It is widely expected that corporate earnings growth in the coming quarters will slow from the 20% or greater rates of growth posted in Q2 and Q3.

And last, most believe that a change in control of the U.S. House of Representatives because of the mid-term elections is NOT likely to impact or restrain the Administration's protectionist trade policies, and it seems increasingly likely that we will have two years of political gridlock before the next general election. President Trump warns of a "war-like" atmosphere in Washington and pundits generally have reduced the odds of enacting bipartisan fiscal stimulus (infrastructure spending, for example) and have increased the odds of having a prolonged government shutdown.

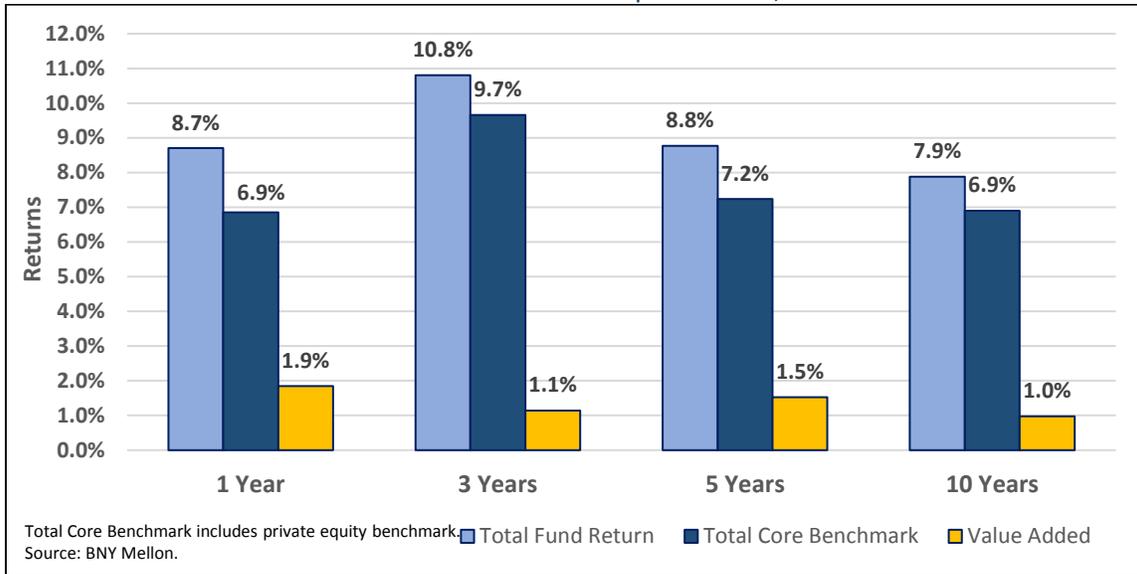
We believe the Fund is appropriately positioned for weakness in world equity markets. Our focus during the past several years has been to reduce our global equity exposure while identifying diversifying assets, primarily in our Portfolio Completion Strategies allocation. However, it is important to note that the PRIT fund is not completely immune to a global equities downturn since to achieve our long-term target return rate, our fund is necessarily growth and equity focused. We believe that the market turbulence thus far in Q4 should be expected for this stage of the economic cycle and, in fact, we have been preparing for it. Remember, we have enjoyed a 10-year bull market since the global financial crisis with the S&P up approximately 300%.

PRIT FUND PERFORMANCE SUMMARY

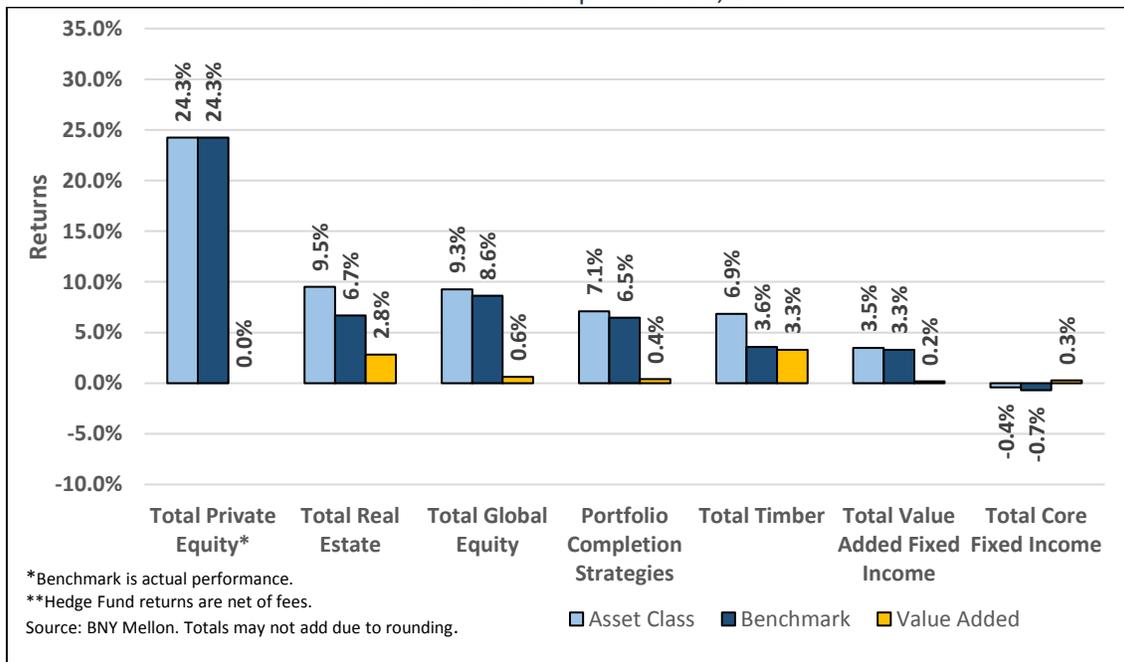
As of September 30, 2018, the PRIT Fund net asset value stood at \$73.8 billion. For the one-year ended September 30, 2018, the PRIT Fund rose 8.7% gross (8.2% net), outperforming the total core benchmark of 6.9% by 182 basis points (136 bps net).

- This performance equates to an investment gain of \$5.7 billion, net of fees.
- This outperformance equates to \$944 million of value above the benchmark return, net of fees.
- All seven major asset classes outperformed their respective benchmarks.
- Net total outflows to pay benefits for the one-year ended September 30, 2018, were approximately \$1.3 billion.

Total PRIT Fund Returns (Gross of Fees)
Annualized Returns as of September 30, 2018



PRIT Asset Class Performance (Gross of Fees)
One Year Ended September 30, 2018



PRIT Core Fund Performance Summary

Gross of Fees Performance

Trailing 1-Year Performance as of September 30, 2018

Trailing 1-Year Performance: September 30, 2018	Return	Benchmark Return	Over/(Under) Benchmark (bps)	\$Value (millions)	% of PRIT Fund
Total PRIT Fund	8.7%	6.9%	182	73,847	100%
Total Global Equity	9.3%	8.6%	63	31,083	42.1%
<i>Domestic Equity</i>	<i>18.3%</i>	<i>17.8%</i>	<i>48</i>	<i>14,675</i>	<i>19.9%</i>
<i>International Developed</i>	<i>3.6%</i>	<i>3.1%</i>	<i>52</i>	<i>11,916</i>	<i>16.1%</i>
<i>Emerging Markets</i>	<i>-1.3%</i>	<i>-1.7%</i>	<i>33</i>	<i>4,493</i>	<i>6.1%</i>
Private Equity	24.3%	24.3%	0	8,010	10.9%
Real Estate	9.5%	6.7%	281	6,421	8.7%
Total Timberland	6.9%	3.6%	328	2,635	3.6%
PCS	7.1%	6.5%	69	10,036	13.6%
Value Added Fixed Income	3.5%	3.3%	19	5,864	7.9%
Core Fixed Income	-0.4%	-0.7%	29	9,063	12.3%

PRIT Asset Class Performance (Gross of Fees)

Annualized Returns as of September 30, 2018

1 Year	3 Year	5 Year	10 Year
PRIVATE EQUITY 24.3%	PRIVATE EQUITY 19.3%	PRIVATE EQUITY 20.1%	PRIVATE EQUITY 14.9%
REAL ESTATE 9.5%	GLOBAL EQUITY 14.1%	REAL ESTATE 10.5%	GLOBAL EQUITY 8.9%
GLOBAL EQUITY 9.3%	REAL ESTATE 9.1%	GLOBAL EQUITY 9.1%	VALUE-ADDED FIXED INCOME 7.5%
TOTAL PCS 7.1%	VALUE-ADDED FIXED INCOME 6.9%	TIMBER 7.2%	REAL ESTATE 7.2%
TIMBER 6.9%	TIMBER 5.6%	TOTAL PCS 4.9%	CORE FIXED INCOME 4.8%
VALUE-ADDED FIXED INCOME 3.5%	TOTAL PCS 5.5%	VALUE-ADDED FIXED INCOME 4.4%	TIMBER 4.6%
CORE FIXED INCOME (0.4%)	CORE FIXED INCOME 2.2%	CORE FIXED INCOME 3.9%	TOTAL PCS 4.6%



PRIM DEVELOPMENTS

Organizational Update

New Hires

PRIM has hired four new full-time employees and two interns since the last meeting.

Sara Coelho joined PRIM this month as a Corporate Accountant on the Finance team. Sara spent several years at Bulger Partners as an accounting analyst and accounts payable clerk and has a bachelor's degree in finance and accounting management from Northeastern University. She reports to Dan Eckman.

Grace Gao Joined PRIM in October as an Investment Research Analyst in the Strategy group, reporting to Eric Nierenberg. Grace recently received her master's degree in finance from MIT Sloan. She previously interned at Baidu, Bain & Company and PwC and earned her bachelor's degree in finance from Peking University in China.

Liu Liu joined PRIM in October on a permanent basis as an Investment Analyst after spending 18 months as an intern working in PRIM's Strategy team also reporting to Eric Nierenberg. Liu received her master's degree in finance from the Brandeis International Business School and earned her bachelor's degree in finance from Shanghai Jiao Tong University in China.

Maureen Aquino joined PRIM in August as our new receptionist. Maureen has almost 20 years of experience as an Office Manager and Receptionist working for AIG in New York. Maureen earned a bachelor's degree from William Patterson University.

The Strategy group also welcomed two new interns this fall. Anita Huang is currently a graduate student at the Brandeis International School of Business, majoring in economics and finance, and Shijia Chen recently received her master's degree in International economics and finance from Johns Hopkins University.

PRIM Staff Milestones

Christina Marcarelli, an Investment Officer on the Real Estate team, has received her CAIA designation (Chartered Alternative Investment Analyst). The CAIA curriculum is designed to provide a broad knowledge in alternative investments including Real Assets, Hedge Funds, Private Equity and structured products. The charter is 2 exams, 2 levels and typically requires 12-18 months and more than 200 hours of study.

PRIM is now 45 people strong now with: 2 Ph.D.'s, 10 Master's Degrees, one J.D., 10 CFAs, 6 CPAs, 2 CAIA and 19 CFA Investment Foundations Program.

Andrew Gromer and Investment Analyst on the Public Markets team was appointed to Chair of the CFA Boston Society Young Leaders Committee. As Chair, Andrew will organize events for the Society's new generation of investment professionals focused on engagement, career development, and networking. It is a very vibrant and active community.

PRIM BOARD ACTIONS

Portfolio Completion Strategies

At its November 29, 2018 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

The PRIM Board authorized the issuance of a Request for Proposal (RFP) for Portfolio Completion Strategies (PCS) consulting services. PRIM's current consulting contract with Aberdeen Asset Management expires June 30, 2019.

The PRIM Board authorized the issuance of an RFP for PCS managed account platform services. The contract with HedgeMark, the current service provider, expires December 31, 2019.

The PRIM Board approved three follow-on investments in the PCS portfolio:

The PRIM Board authorized staff to renew subscriptions annually for each of the three upcoming calendar years (2019, 2020, 2021) of \$100 million to Aeolus Property Catastrophe Keystone PF Fund L.P., and to CATCo Diversified Fund II, respectively. As a reminder, at its November 14, 2017 meeting, the PRIM Board approved initial allocations of \$100 million and \$150 million to the Aeolus Property Catastrophe Keystone PF Fund LP, and to CATCo Diversified Fund II, respectively.

Aeolus is a leading global reinsurance fund manager with approximately \$3.5 billion of capital. Aeolus provides highly customized, indemnity-based reinsurance and retrocession policy coverage to 50-60 cedants (insurance companies), focused on aggregate protection for catastrophe risk, particularly from U.S. hurricanes and global earthquakes. Markel CATCo ("CATCo") is an asset management firm based in Bermuda and focuses on fully collateralized insurance linked securities (ILS). CATCo provides indemnity-based retrocession (reinsurance for reinsurers), serving 40-50 different cedants (the buyers of retrocession coverage). Their focus on writing retrocession cover is backed by in-depth dialogue and modeling based on data provided by cedants on their underlying catastrophe risk exposures.

The PRIM Board approved a capital commitment of up to \$50 million to JEN Partners VI L.P. JEN is a New York-based residential lot-banking and land-development manager. The strategy serves as off-balance sheet financing to homebuilders by targeting residential land development opportunities in select submarkets across the U.S.

Private Equity

At its November 29, 2018 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

The PRIM Board approved a commitment of up to \$75 million to JMI Equity Fund IX, L.P. ("Fund IX" or "JMI IX"). PRIM has not invested in prior JMI Equity funds. JMI will target growth-stage North America-based companies that provide software and technology-enabled services. Nearly all of JMI's prior funds are in the first or second quartiles in Private Equity industry peer performance rankings.

The PRIM Board further approved the addition of JMI Equity to the Board-approved co-investment manager bench because JMI Equity meets PRIM's co-investment criteria. To review, those criteria include:

1) a superior track record, 2) a strong co-investment history, and 3) a willingness to partner with PRIM.

The PRIM Board approved a commitment of up to \$30 million to Flagship Pioneering Special Opportunities Fund II, L.P. (“FSO II”). PRIM has invested in six prior Flagship Pioneering (“Flagship”) funds since 2004. Flagship makes venture capital investments in seed, early- and late-stage companies in therapeutics, nutritional health and agriculture. The fund will invest in Flagship-created companies during their growth stage. Nearly all of Flagship’s prior funds are in the first or second quartiles in Private Equity industry peer performance rankings. In addition, PRIM staff recommends Flagship Pioneering Special Opportunities Fund II, L.P. for the Massachusetts’ Chapter 240 Section 171 requirement.

Including the Private Equity deals approved at its November 29th meeting, plus co-investments, PRIM has approved up to \$1.7 Billion in commitments to the 2018 Private Equity Vintage Year Portfolio. The 2018 investment plan target is \$1.8 Billion.

Real Estate

Following the conclusion of rigorous RFP processes, the PRIM Board approved the following recommendations of the Real Estate & Timberland Committee and PRIM Staff at its November 29, 2018 meeting:

The PRIM Board selected CBRE Global Investors, Stockbridge Real Estate, and DivcoWest to provide Private Real Estate Investment Management Services to PRIM for a combined allocation of up to \$1 billion. CBRE Global Investors and Stockbridge Core and Value Advisors will both receive initial cash allocations of \$400 million, and DivcoWest will receive an initial cash allocation of \$200 million. These commitments may be adjusted based on the opportunity set and the needs of the portfolio.

The PRIM Board selected Altus Group to provide real estate appraisal services to PRIM. As the incumbent service provider, Altus has provided high-quality, timely appraisal reports and has demonstrated knowledge of the markets where PRIM’s assets are located. In addition, Altus has technological and data-compiling capabilities that sets them apart from other firms. As one of the largest appraisal services providers, Altus has significant experience servicing institutional investors and investment managers.

The PRIM Board voted to terminate J.P. Morgan’s core and non-core private real estate account. Nine of the current J.P. Morgan-managed assets will be transferred to Invesco, an existing separate account manager, with the remaining asset being transferred to PRIT Core Realty as an addition to PRIM’s internally managed portfolio.

Finance and Operations

At its November 29, 2018 meeting, the PRIM Board approved the following recommendations of the Administration and Audit Committee and PRIM Staff:

The PRIM Board voted to accept the FY2018 PRIM and PRIT audited financial statements and the Agreed-Upon Procedures (AUP) reports on PRIM’s Procurement Process for Investment Management and Other Professional Services and the PRIT Fund’s Benchmark Calculations. These audits, performed by KPMG, PRIM’s independent external auditor, have concluded with clean opinions and no audit exceptions.

The PRIM Board voted to approve the FY2018 PRIT Fund Comprehensive Annual Financial Report (CAFR), its 14th such report. The primary purpose of this document is to provide a thorough, detailed and transparent presentation of PRIT’s financial position and results of operations. The report has four

sections – Introductory, Financial, Investment and Statistical. PRIM submits its CAFR for a comprehensive review by the Government Finance Officers Association (GFOA) each year, and the GFOA determines if the report continues to qualify for the organization’s prestigious Certificate of Achievement for Excellence in Financial Reporting, which recognizes and encourages excellence in financial reporting by state and local governments. PRIM staff, with assistance of KPMG, prepared the CAFR based upon the GFOA’s checklist.

PRIM ACQUIRES BOSTON OFFICE TOWER

In partnership with Allianz Real Estate and Beacon Capital Partners, the PRIM Board announced on December 7th the purchase of the Exchange Place skyscraper located at 53 State Street, Boston. The 40-story office tower was sold to the group for \$845 million by UBS Realty Advisors. PRIM will own 49% in the 1.24 million square-foot property. The asset is 93% leased and has some notable tenants, including: Hill Holiday, Nixon Peabody, Acquia, The Boston Globe, and Morgan Stanley. PRIM Board Chair, State Treasurer Deborah B. Goldberg, said: “53 State Street is a high-quality acquisition and another example of PRIM’s strategy of investing in excellent properties with potential for long-term gain.” Michael G. Trotsky, CFA, PRIM Executive Director and Chief Investment Officer, added: “Our real estate portfolio includes some of the top office buildings in the US, and this investment is consistent with our overall strategy to generate strong returns for Class A properties.”

The Client Services team -- Paul Todisco, Francesco Daniele and Sam Olivier -- will continue meeting the retirement boards of PRIM’s member retirement systems throughout the year. To schedule a visit, please contact Paul at ptodisco@mapension.com, Francesco at fdaniele@mapension.com or Sam at solivier@mapension.com, or call 617-946-8401. We look forward to seeing you soon.