PRIM Board Quarterly Update

FOURTH 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 February 26, 2019, meeting:

INVESTMENT PERFORMANCE REPORTING MILESTONE

We are pleased to announce that PRIM has adopted the CFA Institute's Global Investment Performance Standards of integrity and transparency, effective January 1st. This performance standard is commonly known as GIPS.

GIPS are universal, voluntary standards based on the fundamental principles of full disclosure and fair representation of investment performance. Many asset owners require their investment managers to comply with the GIPS standards, however it is less common for asset owners such as PRIM and other large public pension funds to apply the principles in their own performance reporting to governing bodies and plan beneficiaries. More than 1,700 asset managers worldwide are GIPS compliant, however PRIM is now one of only a handful of large public pension plans to comply with GIPS.

The GIPS standards are an important part of our commitment to maintain the highest level of integrity and transparency possible. We are proud to be part of the CFA Institute's goal to bring about an ethical, global reporting standard. We have attached a press release from the CFA Institute and PRIM's first **GIPS Compliance Presentation** to this edition of the <u>PRIM Board Quarterly Update</u>.

MARKETS OVERVIEW

The S&P 500 was down 13.5% in the fourth quarter of 2018, developed international markets were down 12.5% and emerging markets were down 7.5%. A 60/40 mix of global stocks and bonds was down 7% in the fourth quarter. The PRIT Fund fared better but was down 6%. For the calendar year 2018, the S&P 500 was down 4.4% and a 60/40 mix of global stocks and bonds was down 5.6%. The PRIT Fund was down only 1.8% for the calendar year.

In December, the S&P 500 was down 9%, marking the worst month in the markets since the Global Financial Crisis (GFC). October was almost as weak with the S&P 500 down 6.8%. The markets experienced similarly large sell-offs most recently in September 2011 and May 2010 when the S&P 500 was down 7% and 8%, respectively. Volatility also increased during the quarter. The volatility index known as the VIX, spiked to more than 36 in December after reaching a low of 11 in August. This compares to a five-year average of approximately 15.

Quarterly sell-offs of this magnitude are not very unusual. There have been 23 large quarterly losses since the Great Depression, specifically 23 in approximately 90 years. This equates to a large sell-off occurring approximately once every four years. Since it has been seven years since the last large quarterly sell-off, perhaps the markets were due for a correction. Be assured that we have been preparing the PRIT Fund for some market weakness. As a reminder, we have reduced our global equity position from 50% eight years ago to a target position of 39% today.



We have identified risks in the market during the last several quarters and have compared the current economic picture to that experienced during mid-2014 through early-2016, when there was a global economic slowdown that led to a correction in world financial markets. We explored the past four major market corrections since 2000 and have noted that all corrections occurred with an economic slowdown or even a contraction. We have highlighted some visible signs that global growth is slowing. While the U.S. economy is still relatively strong, albeit slowing, Europe, China and Japan are slowing considerably. Even in the U.S. economy, manufacturing is weakening, retail sales are weak, housing is weak, consumer confidence has eroded from an 18-year high, industrial material prices are weak and dollar liquidity is tight. Tariffs and trade tensions could negatively impact global growth as well. However, there were vulnerabilities in the global economy before there were tariffs. Earnings growth could also prove to be a formidable headwind for equity markets. With approximately half of the S&P 500 companies reporting earnings, growth rates are well below the 20%+ growth rates posted in the second and third quarters of 2018 and are expected to slow considerably throughout 2019.

Last, political gridlock has become a reality and most think it will last for at least another two years. We have recently endured one of the longest government shutdowns in history as Congress and the President attempted to work out border security and immigration policy differences. The issue will likely be something the courts will decide. President Trump warned of a "war-like" atmosphere in Washington during the midterm elections, and both sides have delivered.

Although we have reduced our global equity position from 50% eight years ago to a target position of 39% today and have increased our exposure to risk-reducing assets, it is important to emphasize that the PRIT Fund is not completely immune to a downturn in global equities. To achieve our long-term target rate of return of 7.35%, the Fund must focus on growth and equities. The PRIT Fund's strong performance in up markets, such as fiscal year 2018 and calendar year 2017, combined with our strong outperformance in down markets, such as calendar year 2018 and fiscal year 2016, gives us confidence that our investment program is performing as intended.

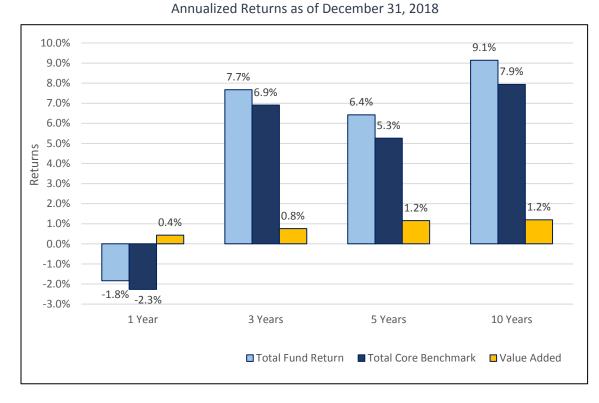
PRIT FUND PERFORMANCE SUMMARY

As of December 31, 2018, the PRIT Fund net asset value stood at \$69.3 billion. For the one-year ended December 31, 2018, the PRIT Fund was down 1.8%, (-2.3% net), outperforming the total core benchmark of -2.3% by 43 basis points (0 bps net).

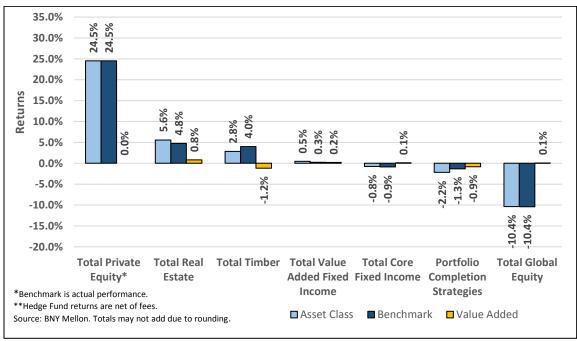
- This performance equates to an investment loss of \$1.6 billion, net of fees.
- Net total outflows to pay benefits for the one-year ended December 31, 2018, were approximately \$1.0 billion.



Total PRIT Fund Returns (Gross of Fees)



PRIT Asset Class Performance (Gross of Fees) Trailing 1-year Performance as of December 31, 2018





PRIT Core Fund Performance Summary Gross of Fees Performance Trailing 1-Year Performance as of December 31, 2018

Trailing 1-Year Performance: December 31, 2018	Return	Benchmark Return	Over/(Under) Benchmark (bps)	\$Value (millions)	% of PRIT Fund
Total PRIT Fund	-1.8%	-2.3%	43	69,285	100%
Total Global Equity	-10.4%	-10.4%	5	26,109	37.8%
Domestic Equity	-5.1%	-5.4%	29	11,713	17.0%
International Developed	-14.5%	-14.2%	(28)	10,277	14.9%
Emerging Markets	-15.2%	-15.2%	(3)	4,119	6.0%
Private Equity	24.5%	24.5%	0	8,335	12.1%
Real Estate	5.6%	4.8%	81	6,476	9.4%
Total Timberland	2.8%	4.0%	(117)	2,843	4.1%
PCS	-2.2%	-1.3%	(85)	9,787	14.2%
Value Added Fixed Income	0.5%	0.3%	20	5,749	8.3%
Core Fixed Income	-0.8%	-0.9%	12	8,975	13.0%

PRIT Asset Class Performance (Gross of Fees)

1 Year	3 Year	5 Year	10 Year
PRIVATE EQUITY 24.5%	PRIVATE EQUITY 20.8%	PRIVATE EQUITY 19.8%	PRIVATE EQUITY 15.9%
REAL ESTATE 5.6%	REAL ESTATE 7.4%	REAL ESTATE 9.7%	GLOBAL EQUITY 10.2%
TIMBER 2.8%	GLOBAL EQUITY 7.0%	TIMBER 5.6%	VALUE-ADDED FIXED INCOME 9.1%
VALUE-ADDED FIXED INCOME 0.5%	VALUE-ADDED FIXED INCOME 6.8%	GLOBAL EQUITY 4.5%	REAL ESTATE 9.0%
CORE FIXED INCOME (0.8%)	TIMBER 5.9%	CORE FIXED INCOME 4.2%	CORE FIXED INCOME 5.2%
TOTAL PCS (2.2%)	TOTAL PCS 3.3%	VALUE-ADDED FIXED INCOME 3.8%	TOTAL PCS 5.0%
GLOBAL EQUITY (10.4%)	CORE FIXED INCOME 2.9%	TOTAL PCS 2.8%	TIMBER 3.0%

Annualized Returns as of December 31, 2018



ORGANIZATIONAL UPDATE

Promotions/Recognitions

In December PRIM announced five promotions:

Andre Abouhala was promoted to Investment Officer. Andre joined PRIM in 2014 as an Investment Analyst and has become a valuable resource to the Public Markets team, most recently leading the U.S. micro-cap research and becoming the team's expert in utilizing the eVestment manager database, FactSet portfolio analysis and the PCS team's proprietary quantitative tools. Andre also earned an MBA from Boston University this past May. Andre will continue to expand his responsibilities in manager monitoring and investment analytics, reporting to Dave Gurtz.

Andrew Gromer, CFA was promoted to Investment Officer. Andrew joined the Public Markets team In October 2016 as an Investment Analyst supporting fixed income investments. More recently, he has also supported the Private Equity team. Andrew is responsible for PRIM's "State of the Industry" research project, which will help guide PRIM's long-term investment strategy. He has participated in several investment industry conference panels where he has spoken on fixed income topics. Andrew earned a CFA Charter in November 2017 and was recently appointed to Chair the CFA Boston Young Leaders Committee. Andrew will report to Dave Gurtz and will continue to expand his responsibilities in manager monitoring and investment analytics.

Bill Li, CFA, CAIA was promoted to Senior Investment Officer – Director of Portfolio Completion Strategies (PCS). Bill joined the Strategy team in 2016 as an Investment Officer and was promoted to Senior Investment Officer in 2017. Bill has expanded and refined PRIM's distinctive suite of analytical tools, manager sourcing processes, idea generation and portfolio construction across several asset class teams. He combines impressive thought creativity and ingenuity with strong technical skills and conceptual understanding. Bill spearheaded the creation of PRIM's hedge fund emerging manager program negotiating new mandates with several hedge fund managers. In addition, he researched and deployed PRIM's innovative and successful equity hedge program utilizing a put spread collar package of trades. Bill will continue to report to Eric Nierenberg and have responsibility for the oversight of the entire PCS portfolio. Last, but not least, Bill was recently inducted into the Volatility and Risk Premia Hall of Fame's 2019 class by EQDerivatives.

Christina Marcarelli, CAIA was promoted to Senior Investment Officer. Christina joined the Real Estate and Timberland team as an Investment Officer in 2016 with expertise in asset management, acquisitions and development projects. Christina has been extremely productive since joining PRIM and this past year she successfully led the private real estate RFP process, which resulted in awarding \$1 billion to three real estate investment managers. She also contributed to the team's direct investing platform and portfolio management research. Christina's collaboration with the PRIM Public Markets and Strategy teams has enabled PRIM to expand investments in the Other Credit Opportunities allocation. Additionally, Christina has earned the CAIA charter. Reporting to Tim Schlitzer, Christina will have increased responsibility for manager and property oversight throughout the entire Real Estate and Timberland portfolio.

George Tsipakis was promoted to Director of Investment Operations. George joined the Investment Operations team in 2016 as Manager of Real Estate and Timberland reporting. He has quickly demonstrated the analytical skills necessary to enable the team to innovate, particularly in the real estate direct investing platform. George also restructured PRIM's investment cash operations and improved the team's investment support capacity. George will report to Matt Liposky and manage a team of four finance and operations professionals responsible for asset class reporting.



We would also like to recognize **Morgan Burns, CFA, CPA** on the accounting team who appeared on the television show Jeopardy recently. It is a very selective group of participants who make it to the television rounds. Contestants must first take an exam and have an in-person screening which includes playing a test round. His results were impressive, admirably finishing in second place. This is no easy feat.

In December, PRIM was nominated as a finalist for the 2018 Institutional Risk Premia Manager of the by EQDerivatives.

PRIM BOARD ACTIONS - FEBRUARY 26, 2019

Asset Allocation

Consistent with its Investment Policy Statement (IPS), the PRIM Board annually reviews its Asset Allocation Plan to consider adjustments to the Plan as may be appropriate given the Plan's long-term nature and objectives. PRIM recognizes that over the long-term, asset allocation is the single greatest contributor of return and risk to the PRIT Fund.

In this year's review, PRIM investment staff took an innovative data-driven approach using a principal component analysis to model the PRIT Fund's asset allocation. In formulating the asset allocation policy, a dual objective was established: 1) a Return Objective that achieves a 7.35% annualized return (the current actuarial return assumption in the Commonwealth's pension funding schedule) across the next 10 years, and 2) Downside Protection that achieves no drawdown (losses) greater than 20% within the next three years.

The first step in the research process was to analyze the forward-looking return expectations of the major asset classes, then, in step two, transform those asset classes into Principal Components. In lay terms, if one looks at asset allocation as a stew, the asset classes are the major ingredients, and the principal components are the nutrients within each ingredient (apologies to Maria Garrahan of PRIM's strategy team who came up with this analogy in her presentation to the Board). Step three was to model return distributions of each Principle Component, then, in step four, simulate 10,000 return paths across 10 years. The final and fifth step was to evaluate the likelihood of achieving PRIM's dual objective.

Blending the systematic returns with PRIM's asset allocation consultant's (NEPC) recommendations and a feasibility analysis from PRIM asset class heads, the PRIM Board approved the following proposals:

- Decrease the Global Equity Target Band and incorporate the Hedged Equity strategy as a component of the Global Equity: The decrease will be sourced from Developed International and Emerging Markets Equities. The increase in Hedged Equity strategy will be funded by U.S. and International Equities.
- Raise safe-haven fixed income exposure to weather a higher volatility environment: Increase the Target Band to Core Fixed Income by 3% by adding a U.S. Short-Term Fixed Income Portfolio. The net increase will be funded across the U.S. treasury curve, which will be funded through a reduction in Global Inflation-Linked Bonds.
- Based on the outlook for liquid credit, reduce the target to Value-Add Fixed Income by 2%.
- Continue to shift the asset allocation ranges higher for private market exposures: Move Private Equity Target Band up by 1%; increase Portfolio Completion Strategies Target Band by 1%.
- Keep Real Estate and Timberland Target Bands the same.
- Reduce REITS within the Real Estate portfolio by 1% to decrease overall portfolio equity beta.



Asset Class Allocations	Current AA Target Range	2019 AA Target Range	2019 AA Target Mid- Point	Mid-Point AA Change From 2018
Global Equity	37% - 47%	34% - 44%	39%	<u>-3.0%</u>
US Equity			13%	-4.5%
Int'l Developed Equities			13%	-2.5%
Emerging Int'l Equities			5%	-1.0%
Hedged Equity			8%	5.0%
Core Fixed Income	9% - 15%	12% - 18%	15%	<u>3.0%</u>
Core Bonds			6%	1.0%
Short-Term Fixed Income			2%	2.0%
Long Duration Treasury			3%	1.0%
Inflation-Linked Bonds			4%	-1.0%
Value-Add Fixed Income	7% - 13%	5% - 11%	8%	<u>-2.0%</u>
Private Equity	9% - 15%	10% - 16%	13%	<u>1.0%</u>
Real Estate	7% - 13%	7% - 13%	10%	-
Private Real Estate			9%	1.0%
Public REITs			1%	-1.0%
Timberland	1% - 7%	1% - 7%	4%	-
PCS	7% - 13%	8% - 14%	11%	<u>1.0%</u>

Capital Market Assumptions ¹	<u>2018 Assumptions</u> Current Target Range	<u>2019 Assumptions</u> 2019 Target Range
5-7 Yr. Returns	6.6%	6.8%
30 Yr. Returns	7.7%	7.9%
Volatility	12.6%	12.1%
Sharpe Ratio 30 Yr.	0.39	0.41

Public Markets

At its February 26, 2019 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

PRIM staff presented a review of the U.S. Small-Cap Portfolio and reported on the results of the U.S. Microcap Request for Proposal (RFP). As part of the of the U.S. Small-Cap review, Huber Capital Management was terminated. PRIM will gradually allocate \$300 million to three new U.S. Microcap firms: Acadian, Brandywine, and Lord Abbett (\$100 million each). Acadian utilizes a bottom-up, quantitative investment process across all its strategies. Both Brandywine and Lord Abbett utilize a bottom-up, fundamental investment process. These three strategies will be part of PRIM's existing dedicated U.S. Small/SMID Cap equity portfolio and will not increase PRIM's overall equity exposure.

Other Credit Opportunity (Value Added Fixed Income)

At its February 26, 2019 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

Anchorage Structured Credit Separate Managed Account (SMA) will receive an initial allocation of \$150



million. The Anchorage Structured Credit SMA seeks to earn attractive risk-adjusted returns predominantly via investing in the equity and mezzanine tranches of Collateralized Debt Obligations (CDOs) that are managed by Anchorage in the primary market in the United States and Europe. Anchorage may also target investments in structured credit tranches from third party issuers in the secondary market in the United States and Europe.

Portfolio Completion Strategies

At its February 26, 2019 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

A commitment of up to \$125 million to the Investcorp Special Opportunities Italian Distressed Loan Fund II ("the Fund"). Investcorp Investment Advisers LLC ("Investcorp") serves as the investment manager of the Fund. Investcorp has appointed Eidos Partners srl ("Eidos") as advisor to the Fund. The Fund will invest in non-performing loans ("NPLs") secured by residential and commercial real estate in Italy. The Fund will purchase small pools of NPLs predominantly from regional Italian banks at discounts to their underlying collateral valuation. Subsequently, the Fund will target to recover the loan either through consensual settlement with the borrower or through a court-based foreclosure process.

An initial allocation of up to \$500 million to the Sightway Capital Fund of One. Sightway's investment strategy encompasses direct private investments in emerging companies, offering a differentiated investment approach to a variety of real asset industries and strategies. The team will focus on asset intensive industries that provide downside coverage and target mid-teens IRRs with over 2x gross equity multiples. The financing and leasing operations which underpin these businesses provide a foundation of cash flow generation even in a run-off scenario. Value realization can come in the form of an IPO, sale, or recapitalization of holdings at a premium to book value.

An initial allocation of up to \$100 million to the BlackRock Aviation Holdings Fund of One. The objective of the Fund of One is to deliver strong risk-adjusted returns by investing in a portfolio of aviation-related hard assets and securities. These will range from aircraft, engines and parts, to various debt-related instruments such as secured, unsecured and private debt, as well asset-backed securities, structured products and derivatives related to the aviation space. The goal is to generate low- to mid- double-digit net returns that have low correlation to publicly traded marketable securities.

Private Equity

At its February 26, 2019 meeting, the PRIM Board approved the following recommendations of the Investment Committee and PRIM Staff:

A commitment of up to \$250 million to Blackstone Capital Partners VIII L.P. ("BCP VIII"). PRIM has invested in six prior Blackstone Capital Partners ("Blackstone") funds since 1993. Blackstone's senior team has worked together for over 20 years. All of Blackstone's funds are in the first or second quartiles in Private Equity industry peer performance rankings. Blackstone targets buyouts of large businesses in North America, Europe and Asia in the consumer and leisure, services, technology media and telecom, industrials, financial institutions group, energy, and healthcare sectors. Blackstone Capital Partners VIII is a private equity fund being established to continue Blackstone's successful approach of investing in buyouts of large companies located in North America, Europe and Asia. BCP VIII will target \$20 billion in aggregate commitments.



A commitment of up to \$75 million to American Industrial Partners Capital Fund VII, L.P. ("Fund VII"). PRIM has not invested in prior American Industrial Partners funds. American Industrial Partners is led by three senior investment professionals with an average tenure of 20 years at the firm. Nearly all of American Industrial Partners' prior funds are in the first or second quartiles in Private Equity industry peer performance rankings. American Industrial Partners targets buyouts of middle-market industrial businesses headquartered in North America. American Industrial Partners is establishing Fund VII to make private equity investments in middle- market industrial businesses headquartered in North America. Fund VII will be \$3 billion in aggregate commitments.

The Board also approved the addition of American Industrial Partners to the Board-approved coinvestment manager bench because AIP meets PRIM's co-investment criteria. Those criteria include: a superior track record; a strong co-investment history; and a willingness to partner with PRIM.

A commitment of up to \$100 million to Providence Strategic Growth IV L.P. ("Fund IV" or "PSG IV"). PSG IV is managed by Providence Strategic Growth Capital Partners ("Providence Strategic Growth" or "PSG"), an affiliate of Providence Equity Partners. PRIM has invested in six Providence Equity Partners' funds since 2001. Providence Strategic Growth's team and strategy will continue to be led by Mark Hastings and Peter Wilde. PSG IV will target private equity investments in growth-oriented, lower middle market companies, primarily in the United States. All of PSG's prior funds are in the first or second quartiles in Private Equity industry peer performance rankings. American Industrial Partners is establishing Fund VII to make private equity investments in middle-market industrial businesses headquartered in North America. Fund VII will be \$3 billion in aggregate commitments.

A commitment of up to \$10 million to Spark Capital VI, L.P. ("Spark VI" or "Fund VI") and a commitment of up to \$20 million to Spark Capital Growth III, L.P. ("Growth III"). PRIM has invested in seven prior Spark Capital ("Spark") funds since 2005. Spark makes venture capital investments in seed, early, and late-stage technology companies. Nearly all of Spark's prior funds are in the first or second quartiles in Private Equity industry peer performance rankings. Spark VI will provide start-up capital to companies leveraging new technologies, new distribution channels, and alternative business models for the media, entertainment, and technology industries. Spark VI will be \$400 million in aggregate commitments and will invest in minority equity positions in private media, entertainment, and technology companies primarily through seed and series A investment rounds. Growth III will make later stage venture capital investments targeting media, entertainment, and technology companies in aggregate commitments.

An additional commitment of \$25 million to Lovell Minnick Equity Partners V, L.P. The Investment Committee and PRIM Board approved staff's recommendation to commit up to \$150 million at the meetings on July 31, 2018 and August 14, 2018, respectively. Lovell Minnick offered PRIM an additional commitment of \$25 million in Lovell Minnick Equity Partners V, L.P. The total PRIM commitment to Lovell Minnick Equity Partners V, L.P. will be \$175 million.

The Board approved the following changes to PRIM's private equity co-investment program and guidelines.

- Increasing annual investment policy limit for co-investments from 10% to 20% of private equity annual commitments.
- Increasing equity size limit for each co-investment from \$30 million to \$75 million.
- Removing leverage test and joint control test.



The recommended changes to the Board-approved private equity co-investment program and guidelines are designed to increase the PRIT Fund's allocation to the co-investment program, and to delegate additional authority to Staff when recommending co-investments to the Executive Director and Chief Investment Officer.

Real Estate

The PRIM Board approved the following changes to PRIM's Investment Policy Statement, as recommended by PRIM staff and the Real Estate and Timberland Committee:

- Lower the target range for REITs to 0-30% from 10-30%, with a long-term objective of increasing exposure to private real estate.
- Increase the target range for private Core real estate to 60-100% from 60-80%.

The Board also approved PRIM staff's recommendation that invested capital available for internal management opportunities be increased to 15% (approximately \$1 billion) of the total real estate net asset value (NAV). All individual investments will continue to require Committee and Board approval. Fee savings at 40 basis points equates to \$4million per year.

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.

