Investment Overview

Presented by
T.J. Carlson, Chief Investment Officer
Investment Overview

• Performance and Asset Allocation
• Public Equities
• Fixed Income
• Real Estate
• Real Return
• Absolute Return
• Private Equity
• Compliance
• Risk Management
Performance and Asset Allocation
TMRS INVESTMENT PORTFOLIO
Asset Allocation

6/30/2016 Allocation updated for Un-funded Commitments as of 9/30/2016

Target Allocation Adopted July 2015

Total Market Value: $24.3 Billion

Cash equivalents allocation represents unallocated invested cash equivalent instruments. The sum of individual asset class allocations may not add up to 100% due to rounding. Source: State Street Investment Analytics
TMRS INVESTMENT PORTFOLIO
Gross Performance By Asset Class
June 2016

1 Year Performance

5 Year Performance

Gross returns
*Real Estate return as of prior quarter end (real estate returns are available on a quarterly basis only)
+Absolute Return returns are a mix of gross and net.
^Non-Core Fixed Income, Real Return, Real Estate, Absolute Return performance are the annualized return since inception, given their performance history are less than 5 years

Source: State Street Investment Analytics – Preliminary performance estimate
Public Equities
Public Equities
Asset Class Overview

US Equity

- Objective
  - Intended to provide capital appreciation and is structured using a Core-Satellite Approach with the overall objective of exceeding its benchmark performance net of fees over rolling five year periods.
  - Satellite strategies (Active and Rules-Based strategies with an active component) are expected to add excess return within established tracking error limits and will meet quality, diversification, and liquidity guidelines as specified in the Managers’ contracts.

International Equity

- Objective
  - Intended to provide capital appreciation and diversification, and is structured using a Core-Satellite Approach with the overall objective of exceeding its benchmark performance net of fees over rolling five year periods.
  - Satellite strategies (Active and Rules-Based strategies with an active component) are expected to add excess return within established tracking error limits and will meet quality, diversification, and liquidity guidelines as specified in the Managers’ contracts or otherwise agreed to in writing between TMRS and the Investment Manager.
Public Equities
Manager Diversification
As of June 30, 2016

Based on June State Street preliminary performance.
Note: Percentages may not be exact due to rounding.
Fixed Income
Objective

• Purpose is to diversify the risk of the overall investment portfolio with a secondary goal of capital preservation.

• Performance objective is to exceed the Barclay’s US Aggregate Bond Index net of fees over rolling five-year periods and within tracking errors as specified in the Manager contracts, determined according to the specific strategies employed.

Investment Philosophy- BlackRock

• Top down determination of investment themes are based on bottom-up inputs. Investment themes establish parameters for sector, sub-sector and security selection. Macro overlays for duration and volatility are viewed as a separate sector and used opportunistically.

Investment Philosophy- PIMCO

• PIMCO’s investment philosophy is driven by diversifying strategies and focuses on longer term secular (3-5 year) trends.

• Seek to add value through top down strategies including interest rate exposures, duration, volatility, yield curve positioning and sector rotation.

• Employ “bottom-up” strategies through in depth credit analysis and specific security selection.
Core Fixed Income Allocation

As of June 30, 2016

<table>
<thead>
<tr>
<th>Mandate</th>
<th>Market Value</th>
<th>% of Total Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORE FIXED INCOME</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BlackRock</td>
<td>$4,089,299,168</td>
<td>16.84%</td>
</tr>
<tr>
<td>PIMCO</td>
<td>$2,024,051,340</td>
<td>8.34%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$6,113,350,508</td>
<td>25.18%</td>
</tr>
</tbody>
</table>

Core Weighting vs. Target

![Bar chart showing actual, target, and difference percentages.]

- Core Weighting: 25.2%
- Target: 25%
- Difference: 0.2%

NOTE: Based on preliminary figures.
Non Core Fixed Income Asset Class Overview

Objective

- The purpose is to enhance total return through income and capital appreciation and provide diversification to the total investment portfolio. This allocation may be managed actively and/or passively through multiple managers in consideration of manager concentration risk.

- The Performance Objective is to exceed the returns of a blended benchmark comprised of the Barclays US Corporate High Yield Index 50%, the JPM GBI-EM Global Diversified Index (USD Unhedged) 25%, and JPM CEMBI Broad Diversified Index 25%, net of fees over rolling five-year periods and within tracking errors as specified in the manager contracts or otherwise agreed to in writing, determined according to the specific strategies employed.
Non-Core Fixed Income Allocation

As of September 30, 2016

<table>
<thead>
<tr>
<th>Mandate</th>
<th>Market Value</th>
<th>% of Total Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NON-CORE FIXED INCOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guggenheim</td>
<td>$394,764,640</td>
<td>1.57%</td>
</tr>
<tr>
<td>Highland</td>
<td>$389,824,163</td>
<td>1.55%</td>
</tr>
<tr>
<td>Voya Investment Management</td>
<td>$394,033,792</td>
<td>1.57%</td>
</tr>
<tr>
<td>Ellington Management Group</td>
<td>$392,348,871</td>
<td>1.56%</td>
</tr>
<tr>
<td>Golub*</td>
<td>$300,000,000</td>
<td>1.20%</td>
</tr>
<tr>
<td>White Oak*</td>
<td>$200,000,000</td>
<td>0.80%</td>
</tr>
<tr>
<td>TCW**</td>
<td>$300,000,000</td>
<td>1.20%</td>
</tr>
<tr>
<td>H.I.G. Whitehorse**</td>
<td>$150,000,000</td>
<td>0.60%</td>
</tr>
<tr>
<td>Alliance Bernstein**</td>
<td>$240,000,000</td>
<td>0.96%</td>
</tr>
<tr>
<td>BlueBay**</td>
<td>$240,000,000</td>
<td>0.96%</td>
</tr>
<tr>
<td>Marathon SPS*</td>
<td>$150,000,000</td>
<td>0.60%</td>
</tr>
<tr>
<td>Marathon ECO**</td>
<td>$100,000,000</td>
<td>0.40%</td>
</tr>
<tr>
<td>Marathon RR**</td>
<td>$50,000,000</td>
<td>0.20%</td>
</tr>
<tr>
<td>Beach Point*</td>
<td>$200,000,000</td>
<td>0.80%</td>
</tr>
<tr>
<td>PIMCO COF II**</td>
<td>$200,000,000</td>
<td>0.80%</td>
</tr>
<tr>
<td>Columbia**</td>
<td>$300,000,000</td>
<td>1.20%</td>
</tr>
<tr>
<td>Neuberger Berman**</td>
<td>$300,000,000</td>
<td>1.20%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$4,300,971,466</td>
<td>17.15%</td>
</tr>
</tbody>
</table>

**Non-Core Weighting vs. Target**

- Actual: 17.1%
- Target: 20.0%
- Difference: -2.9%

NOTE: Based on preliminary figures.
*Partially funded.
**Approved but not funded
Real Estate
Real Estate
Asset Class Overview

• Objective
  • To enhance total return and provide diversification to the overall investment portfolio.
  • Due to the illiquid and cyclical nature of the real estate asset class, Staff and the Real Estate Investment Consultant recommend that the target allocation be invested over a multi-year period in order to avoid considerable vintage year risks.

• Performance Objective
  • Long term performance objective is a real rate of return (adjusted for inflation) of five percent (5%) net of investment management fees.
  • The real estate portfolio is expected to generate returns, net of all fees and expenses, in excess of their respective indices, over rolling five year investment time horizons.
Real Estate Manager Diversification

Seeking top performing managers to form beneficial partnerships for the TMRS real estate portfolio. The number of partnerships is being watched closely so monitoring and maintenance does not become an undue cost.

Sizing of manager relationships remains critical, based upon portfolio needs, manager capabilities & opportunity set.

**Real Estate Portfolio Manager Diversification**
(by Adj. Commitments)

- **Blue-scale: Core Mandates**
- **Purple-scale: Value-Add**
- **Orange-scale: Opportunistic**

- Blackstone Property Partners (2016)
- Stockbridge SmartMarkets (2011)
- USAA Eagle Fund (2015)
- Harrison Street Core Fund (2011)
- H/2 Credit Partners (2015)
- Walton Street Debt I (2014)
- H/2 Core Debt (2015)
- Abacus CIF I (2013)
- Stockbridge VA Fund I (2012)
- Greenfield Acquisition Partners VII (2013)
- Rubenstein PF II (2012)
- Greenfield Acquisition Partners VI (2012)
- Miller Global VII (2012)
- Stockbridge VA Fund II (2014)
- Abacus Multi-Family Fund III (2014)
- Rubenstein PF III (2015)
- Torchlight DOF V (2015)
- DivcoWest V (2016)
- Abacusc Multi-Family Fund II (2012)
- Alcion Ventures III (2015)
- TPG Realty Fund II (2015)
- Kiitlare EP II (2016)
- Walton Street Equity VII (2012)
- Lubert-Adler Fund VII (2013)
- Moorfield Real Estate Fund III (2014)
- Tristan EPISO IV (2015)
Real Estate Portfolio Diversification

Property Type Diversification Based on Market Value

- Residential: 33.6%
- Industrial: 16.5%
- Retail: 14.5%
- Office: 24.6%
- Hotel: 6.1%
- Mixed Use: 0.5%
- Other: 0.8%
- Storage: 1.6%
- Land: 1.1%
- Healthcare: 0.7%

Geographic Diversification Based on Market Value

- US Not Allocated: 0.3%
- West: 29.7%
- Midwest: 12.1%
- East: 24.9%
- South: 30.7%
- Europe: 1.5%
- Global Not Allocated: 0.8%

Figure 3: Sector Diversification Based on Market Value

- Core: 65.6%
- Value: 24.1%
- Opp.: 10.3%

Source: Courtland Q4 2015 Report
Real Return
Objective

- Purpose is to enhance total return and provide diversification and hedge against inflation risks to the overall investment portfolio.
- Due to the varied nature of the Real Return space the portfolio will include strategies across a variety of real asset types as well as a number of investment vehicle types in order to maintain a diversified approach.

Performance Objective

- Long term performance objective over a period of 5 years or a full market cycle is a real rate of return (adjusted for inflation) of CPI + 400 basis points.
- On a short term basis the real return portfolio is expected to generate returns net of all fees and expenses, in excess of their respective indices individually and in excess of the Barclay’s World Government Inflation Linked Bond Index for the portfolio as a whole.
Real Return Allocation
As of June 30, 2016

Real Return Manager Diversification by Commitment

- Colchester: 47%
- Nuveen: 4%
- Cohen & Steers: 4%
- Brookfield: 17%
- Magnetar: 7%
- AMERRA: 17%
- Orion: 17%

Post-Recommendation Exposure by Manager

- Colchester: 40%
- Nuveen: 16%
- Cohen & Steers: 15%
- Brookfield: 15%
- Magnetar: 15%
- AMERRA: 15%
- Orion: 15%
- Unallocated: 3%
## Liquid Real Return Portfolio Management Structure
### June 30, 2016

<table>
<thead>
<tr>
<th>MANAGER</th>
<th>STRATEGY</th>
<th>PORTFOLIO BENCHMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colchester</td>
<td>Active Global Linkers</td>
<td>Barclays World Govt Infl-Linked Bond Index</td>
</tr>
<tr>
<td>Nuveen</td>
<td>Real Asset Income – Public Securities</td>
<td>28% S&amp;P Global Infrastructure Index, 21% FTSE EPRA/NAREIT Developed Index, 18% Wells Fargo Hybrid and Preferred Securities REIT Index, 15% Barclays Global Capital Securities Index, 18% Barclays U.S. Corporate High Yield Index</td>
</tr>
<tr>
<td>Cohen &amp; Steers</td>
<td>Real Assets Multi-Strategy</td>
<td>27.5% Bloomberg Commodity Index, 27.5% FTSE NAREIT Developed Real Estate Index (Net), 15% Dow Jones Brookfield Global Infrastructure Index, 15% S&amp;P Global Natural Resources Index—Net, 10% BAML US Corporate Index, 1–3 Years and 5% Gold Index</td>
</tr>
</tbody>
</table>
## Private Real Return Portfolio Management Structure
### June 30, 2016

<table>
<thead>
<tr>
<th>Manager</th>
<th>Strategy</th>
<th>Allocated/Committed</th>
<th>Drawn / Invested (Quarterly)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetar</td>
<td>Energy Finance</td>
<td>$100,000,000</td>
<td>$ 19,757,624</td>
</tr>
<tr>
<td>Orion</td>
<td>Mining Finance</td>
<td>$100,000,000</td>
<td>$ 6,009,728</td>
</tr>
<tr>
<td>Amerra</td>
<td>Agriculture Finance</td>
<td>$100,000,000</td>
<td>-</td>
</tr>
<tr>
<td>Brookfield</td>
<td>Infrastructure</td>
<td>$150,000,000</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: TMRS Accounting*
Absolute Return
Absolute Return Asset Class Overview

• Objective
  • Purpose is to diversify equity and credit market risk by targeting hedge fund return streams that are independent of the directionality of the broad stock and bond markets. The ARS portfolio will be invested in a wide variety of hedge fund strategies, with specific constraints on overall portfolio risk and individual manager exposure.
  • Performance objective is to exceed the benchmark, defined as the HFRI Fund of Funds Index, net of fees, and to earn in excess of cash (90-day Libor) plus 5% on an ongoing rolling 5-year period.

• Investment Philosophy
  • Predicated on manager skill in:
    • Rotating (long/short trading) market factors based on valuation
    • Navigating less liquid, non public and opaque markets
    • Navigating special situations
    • Predicting and capturing market trends
  • Accordingly, ARS is not an “asset class” (or market sector)
Absolute Return Allocation
As of Sept. 30, 2016

Absolute Return: Strategy Diversification
- Equity: 22%
- Credit: 18%
- Relative Value: 7%
- Event Driven: 9%
- Multi-Strat: 19%
- Macro/CTA: 26%

Absolute Return: Manager Diversification
- Blackstone: 55%
- Manager 1: 3%
- Manager 2: 3%
- Manager 3: 3%
- Manager 4: 2%
- Manager 5: 3%
- Manager 6: 4%
- Manager 7: 3%
- Manager 8: 3%
- Manager 9: 3%
- Manager 10: 3%
- Manager 11: 3%
- Manager 12: 3%
- Manager 13: 3%
- Manager 14: 4%
- Manager 15: 3%

Policy Guidelines
- No more than 15% with any one investment manager (excluding FoFs)
- No more than 10% in any one investment vehicle (excluding FoFs)

NOTE: Percentages may not be exact due to rounding
Private Equity
Private Equity Asset Class
Asset Class Overview

● Objective
  ● The primary objective is to enhance the total return of the overall investment portfolio, and secondarily to provide diversification. Private Equity investments are commingled funds structured as limited partnerships with capital commitments that are drawn down over time based on manager discretion. Potential distributions are made as a fund matures and investments are typically realized over an 8-12 year horizon.
  ● The long term policy objective is to meet or exceed the Russell 3000 + 3.00% over periods of five years or greater.

● Investment Philosophy
  ● Manager selection is critical, and managers add value through:
    ● Reducing agency conflicts and aligning equity holder/executive incentives
    ● Investment structuring and balance sheet management
    ● Deep sector experience and creating operating efficiencies
    ● Navigating non-public information and capturing illiquidity premia
  ● *Due to the illiquid nature of the Private Equity asset class, the target allocation will be invested over a multi-year period in order to avoid considerable vintage year risks.*
Private Equity Allocation
As of June 30, 2016

NOTE: Percentages may not be exact due to rounding

Policy Strategy Range

Control/Buy-out  40.0% to 75.0%
Venture/Growth/Minority  5.0% to 25.0%
Special Situations/Opportunistic  10.0% to 35.0%
Private Equity Allocation
As of June 30, 2016

Policy Guidelines

No more than 35% with any one investment manager
No more than 25% in any one investment vehicle

NOTE: Percentages may not be exact due to rounding
Compliance
• IPS Objectives
  – The primary objective of Compliance is to implement a detailed compliance program which uses a combination of daily, weekly and monthly testing of all testable parameters of the Investment Policy Statement and all Manager guidelines at the Manager, asset class and total fund level, as appropriate.
  – Testing may be completed either through systematic resources (automated custodial compliance) or manually if necessary.
  – Compliance personnel shall create and present a quarterly report to the Board with the results of the testing performed during each period.
### Investment Guideline Compliance

**March 2016**

<table>
<thead>
<tr>
<th>Policy Guidelines</th>
<th>Core Fixed Income</th>
<th>Non-Core Fixed Income</th>
<th>Real Return</th>
<th>Domestic Equities</th>
<th>Global Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Quality</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Liquidity/Cash Management</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Permissible/Prohibited Investments</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Concentration Risk</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Country/Region &amp; Currency</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Issue/Issuer</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sector &amp; Asset Type</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Interest Rate Risk</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Spread Risk</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

- 366 separate compliance tests were run on TMRS portfolios as of March 31, 2016.
  There were no active violations of TMRS guidelines.
Risk Management
Objective
- Identification, evaluation and management of all risks related to investment results.

Responsibilities:
- Defining the policy and strategy for investment risk management
- Building a risk aware culture within the organization
- Analytical tools for investment risk management
- Reporting on investment risk to the Board

Risk Report: Q1 2016
- One year outlook market volatility has increased from year end but is still a lot lower than long term expectations
- Forward looking Tracking Error has increased to 1.8% from 1.6%, with 1.1% due to pending policy allocations
## Risk Management Update

### March 2016

<table>
<thead>
<tr>
<th>Topic</th>
<th>Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board and Internal Risk Reporting</td>
<td>Providing quarterly Board Risk Reports for the total fund and internal asset class reports analyzing active risk taken by our public market managers.</td>
</tr>
<tr>
<td>Specialized Risk Analysis</td>
<td>Applying and further developing specialized risk analysis solutions for Alternative Asset Class investments</td>
</tr>
<tr>
<td>Performance Attribution</td>
<td>Performance Attribution allows us to better distinguish manager skill from luck by breaking down (attributing) monthly returns to specific manager decisions. Refining attribution measures, adding new accounts and strategies, and working on summary observations.</td>
</tr>
<tr>
<td>Data Management Solution for Account Related information</td>
<td>Narrowly focused Data Warehouse was developed to satisfy detailed portfolio data needs of the Performance Attribution System. Currently expanding Data Warehouse to cover all Account Related reporting needs, converting to more powerful IT platform and shifting Investment Data Analyst position to functionally report to the IS Department.</td>
</tr>
<tr>
<td>Performance Reporting</td>
<td>Expanding Performance Reporting procedures and methodology to incorporate new asset types, new investment vehicles, and increased transparency. Adding un-lagged performance reporting which will show returns for all accounts properly aligned with the time periods when they were earned¹.</td>
</tr>
<tr>
<td>Quantitative Portfolio Analysis</td>
<td>Monitoring advances in quantitative portfolio analysis to ensure that risk and performance analysis remain current at TMRS</td>
</tr>
</tbody>
</table>

¹. Private market asset classes, like Real Estate, are priced quarterly with a quarter lag due to use of appraised value pricing in the absence of market prices. For some asset class funds in less liquid public markets this is also true, although to a lesser extent and the lag is only one month.
DISCLOSURE

TMRS periodically discloses public information that is not excepted from disclosure under Section 552.0225(b) of the Texas Public Information Act. Information provided by a manager, a general partner or other data provider to TMRS or a TMRS service provider, and contained in these materials, may have been independently produced or modified by TMRS or the TMRS service provider.
QUESTIONS?