

December 2022

# BUILDING THE TRUST

## Investment Management



**Teacher Retirement System of  
Texas**  
1000 Red River Street  
Austin, Texas  
78701-2698



**TEACHER RETIREMENT SYSTEM OF TEXAS MEETING  
BOARD OF TRUSTEES  
AND  
INVESTMENT MANAGEMENT COMMITTEE**

*(Committee Chair and Members: Mr. Corpus, Chair; Mr. Hollingsworth; Mr. Moss,  
Ms. Sissney and Mr. Walls, Jr.)*

*All or part of the December 8, 2022, meeting of the TRS Investment Management Committee and Board of Trustees may be held by telephone or video conference call as authorized under Sections 551.130 and 551.127 of the Texas Government Code. The Board intends to have a quorum and the presiding officer of the meeting physically present at the following location, which will be open to the public during the open portions of the meeting: **1000 Red River, Austin, Texas 78701 in the TRS East Building, 5<sup>th</sup> Floor, Boardroom.***

*The open portions of the December 8, 2022, meeting are being broadcast over the Internet. Access to the Internet broadcast and agenda materials of the meeting is provided at [www.trs.texas.gov](http://www.trs.texas.gov). A recording of the meeting will be available at [www.trs.texas.gov](http://www.trs.texas.gov).*

**AGENDA  
December 8, 2022 – 12:00 p.m.**

1. Call roll of Committee members.
2. Consider the approval of the proposed minutes of the September 2022 committee meeting – Committee Chair.
3. CIO Update including Fleet Strategy; Talent Management; Accomplishments; Notices, Key Dates and Upcoming Events, and Market Update – Jase Auby.
4. Discuss the Third Quarter 2022 Performance Review – Steve Voss and Mike McCormick, AON.
5. Annual Update of the Trading Group – Jamie Llano.
6. Annual Update of Risk and Portfolio Management – James Nield and Mark Telschow.

NOTE: The Board of Trustees (Board) of the Teacher Retirement System of Texas will not consider or act upon any item before the Investment Management Committee (Committee) at this meeting of the Committee. This meeting is not a regular meeting of the Board. However, because the full Committee constitutes a quorum of the Board, the meeting of the Committee is also being posted as a meeting of the Board out of an abundance of caution.



## **Minutes of the Investment Management Committee September 15, 2022**

The Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas met on Thursday, September 15, 2022, in the boardroom located on the Fifth Floor in the East Building of TRS' offices located at 1000 Red River Street, Austin, Texas, 78701.

### **Committee members present:**

Mr. David Corpus, Chair  
Mr. Jarvis Hollingsworth  
Mrs. Nanette Sissney  
Mr. Robert H. Walls, Jr.

### **Other TRS Board Members present:**

Mr. John Elliott  
Mr. James D. Nance  
Ms. Nanette Sissney

### **Others present:**

Brian Guthrie, TRS  
Andrew Roth, TRS  
Heather Traeger, TRS  
Jase Auby, TRS  
Amanda Jenami, TRS  
Don Green, TRS  
Katy Hoffman, TRS  
James Nield, TRS  
Stephen Kim, TRS  
Katherine Farrell, TRS  
Suzanne Dugan, Cohen Milstein  
Dr. Keith Brown, Board Advisor  
Steve Vos, AON  
Mike McCormick, AON.

Investment Management Committee Chair, Mr. David Corpus, called the meeting to order at 2:23 p.m.

### **1. Call roll of Committee members.**

Ms. Farrell called the roll. A quorum was present, Mr. Moss was absent.

### **2. Consider the approval of the proposed minutes of the July 2022, Investment Management Committee meeting – Chair David Corpus.**

On a motion by Mr. Hollingsworth, seconded by Ms. Sissney, the committee approved the proposed minutes for the July 2022 Investment Management Committee meeting as presented.

**3. CIO Update including Fleet Strategy; Talent Management; Accomplishments; Notices; Awards and Key Dates and Upcoming Events and Market Update – Jase Auby.**

Mr. Jase Auby noted the past quarter was tough for the Trust, ending June 30<sup>th</sup> with \$184.4 billion. He reported that TRS received a credit rating of AAA from S&P, which helps the Fund achieve better funding levels as leverage for the Fund is implemented. He said attrition from a management perspective was the toughest challenge facing IMD, on record for a 14.9 percent attrition rate for the year. Mr. Auby reviewed the metrics noting for the first time there are positive alphas in all three of the major metrics: 66 basis points for alpha for total Trust on a rolling three-year basis, 77 basis points for private, and a positive 36 for public markets. Mr. Auby then provided the Committee an update on the market.

Mr. Auby presented his eleventh special topic to the Board regarding the concept of sentiment in TRS investment processes.

**4. Discuss the Second Quarter 2022 Performance Review – Steve Voss and Mike McCormick, Aon**

Mr. Mike McCormick began by noting it has been a difficult quarter, as well as the trailing one-year period. He noted the real return portfolio has done well, up almost 26 percent. He said with rates rising and equity markets falling creates a headwind for that part of the portfolio. He noted the real return and private asset components of the portfolio are working as a backstop to maintain the return of the portfolio at a better level considering the environment. He said over the last 12 - 18 months the return differential between private and public assets has been very meaningful. He reviewed the asset allocation of the Trust relative to the policy target. He said the portfolio is fairly in line with the policy targets, as well as the long-term target. He said the largest differential was an underweight in long Treasuries which were offset by an overweight with absolute returns. He said considering the Trust was down 2.3 percent while stocks were down 16.5 percent and US bond market down 15.3 percent really showed the benefits of diversification.

**5. Semi-annual Risk Report – James Nield and Stephen Kim.**

Mr. James Nield began by noting all eight risk metrics were in compliance. He provided additional commentary on four of these metrics: asset allocation, drawdown risk, liquidity, and counterparty risk. Mr. Stephen Kim reviewed one of the foundational tools to manage drawdown risk of the Trust is scenario analysis. He said the scenario analysis attempts to find weaknesses and strengths of the portfolio by taking current holdings through historical and hypothetical scenarios, stress tests, to ensure the Trust is prepared. He said another use of stress testing is to manage the Trust liquidity. He reported this past quarter did not end up straining the Trust liquidity, there is still 4.7 times the source of liquidity. He noted the liquidity risk was updated to use March 2020 rather than October 2008 as the worst rolling month.

Mr. Nield provided an update on the counterparties TRS interacts with on a daily basis. He reviewed the four major types of categories: the futures clearing merchants, over the counter counterparties, securities lending agent and custodian and repurchase counterparties. Mr. Nield concluded by stating there was an underweight investment exposure in the second quarter, primarily global equities which proved beneficial. He said the overweight in private equity was offset by an underweight in public equity.

There being no more business before the Investment Management Committee, the committee adjourned at 3:17 p.m.

Approved by the Investment Management Committee of the Board of Trustees of the Teacher Retirement System of Texas on December \_\_ 2022.

---

Katherine H. Farrell  
Secretary to the Board of Trustees  
Teacher Retirement Systems of Texas

---

Date





# CIO Update

Jase Auby, Chief Investment Officer

December 2022



# CIO Update

## IMD at a Glance

### Priorities

- **Performance.** As of 9/30/2022, Trust value is \$173.3 billion with a one-year absolute return of -9.9% and 40 bp of excess return
- **Private Markets.** Private Markets currently are 42% of the Trust versus a neutral target of 35%
- **Alpha.** Return of active management and fundamental investing
- **Summits.** Hosted Strategic Partnership Network (SPN) Public Summit in New York City and Legal Summit in Austin
- **Annual Planning.** Engaged in annual priority-setting and capital-planning processes in preparation for 2023

### Key Dates and Upcoming Events

| Event  | Location       | Dates             |
|--|----------------|-------------------|
| IMD Town Hall  | Austin, TX     | February 3, 2023  |
| TRS Emerging Manager Conference                            | Virtual        | February 22, 2023 |
| Council of Institutional Investors (CII) Spring Conference | Washington, DC | March 6-8, 2023   |

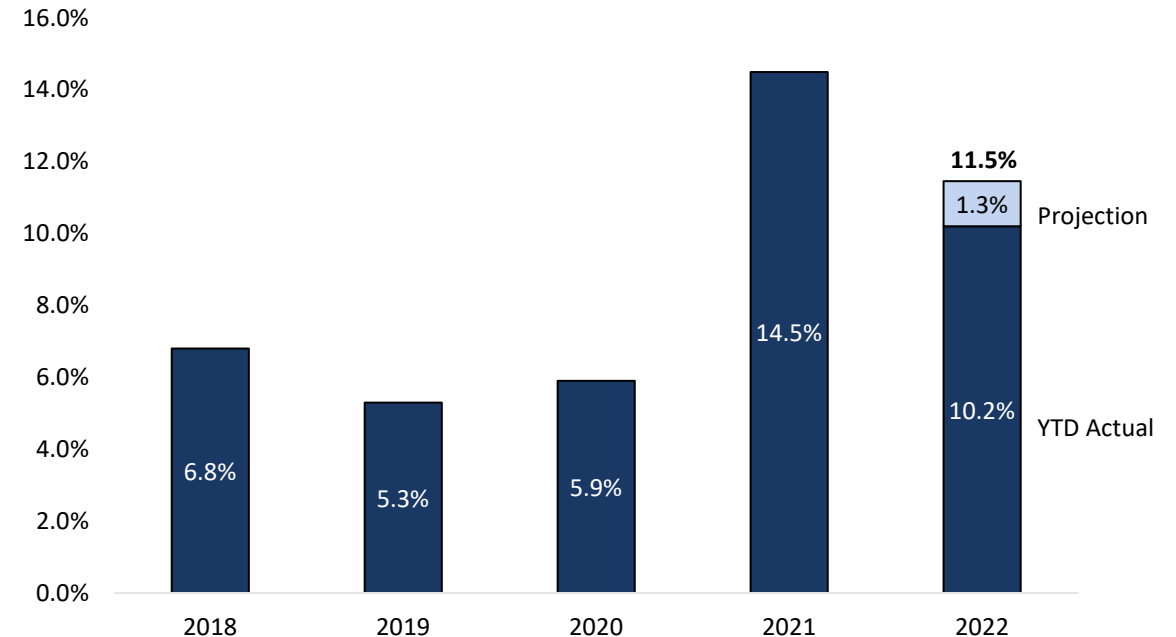
### Our People

#### Snapshot as of November 2022

|                 |     |
|-----------------|-----|
| IMD FTEs        | 216 |
| Shared-Services | 21  |
| Contractors     | 15  |
| Secondees       | 5   |

| Activity   | Phase I | Phase II | Phase III |
|------------|---------|----------|-----------|
| Hired      | 32      | 30       | 13        |
| Recruiting | 0       | 0        | 2         |
| Pipeline   | 0       | 1        | 10        |
|            | 32      | 31       | 25        |

### Attrition Trend 2018 – 2022 (As of November 2022)



# CIO Update

## Metrics Reporting – As of September 30, 2022



| Metric                                     | Objective  | Target   | Q4 2021   | Q1 2022         | Q2 2022         | Q3 2022         |
|--|--|--|---|-----------------|-----------------|-----------------|
| <b>Total Trust Excess Return</b>           | Return in excess of the benchmark return for the Total Trust (3 Year Rolling)                              | <b>+100 bp</b>   | <b>+10 bp</b>   | <b>+33 bp</b>   | <b>+66 bp</b>   | <b>+36 bp</b>   |
| <b>Private Markets Excess Return</b>       | Return in excess of the benchmark return for Private Markets investments (3 Year Rolling)                  | <b>+155 bp</b>   | <b>+174 bp</b>  | <b>+127 bp</b>  | <b>+77 bp</b>   | <b>-2 bp</b>    |
| <b>Active Public Markets Excess Return</b> | Return in excess of the benchmark return for Active Public Markets investments (3 Year Rolling)            | <b>+100 bp</b>   | <b>-36 bp</b>   | <b>-14 bp</b>   | <b>+36 bp</b>   | <b>+23 bp</b>   |
| <b>Principal Investments</b>               | Percent of portfolio capital plan in principal investments approved (cumulative year-to-date) <sup>1</sup> | <b>2021: 42%</b><br><b>2022: 42%</b>   | <b>2021: 52%</b>  | <b>YTD: 45%</b> | <b>YTD: 36%</b> | <b>YTD: 40%</b> |
| <b>Public Equity Allocation</b>            | Percent of internal public equity allocation   | <b>45%</b>   | <b>51%</b>  | <b>52%</b>      | <b>50%</b>      | <b>50%</b>      |
| <b>Estimated Net Fee Savings</b>           | External manager annual net fee savings <sup>2</sup>   | <b>2018: \$53M</b><br><b>2019: \$64M</b><br><b>2020: \$80M</b><br><b>2021: \$105M</b><br><b>2022: \$138M</b> | <b>2018: \$46M</b><br><b>2019: \$65M</b><br><b>2020: \$93M</b><br><b>2021: \$117M</b><br><b>2022: To be reported April 2023</b><br><b>Total: \$321M</b> |                 |                 |                 |





# Teacher Retirement System of Texas

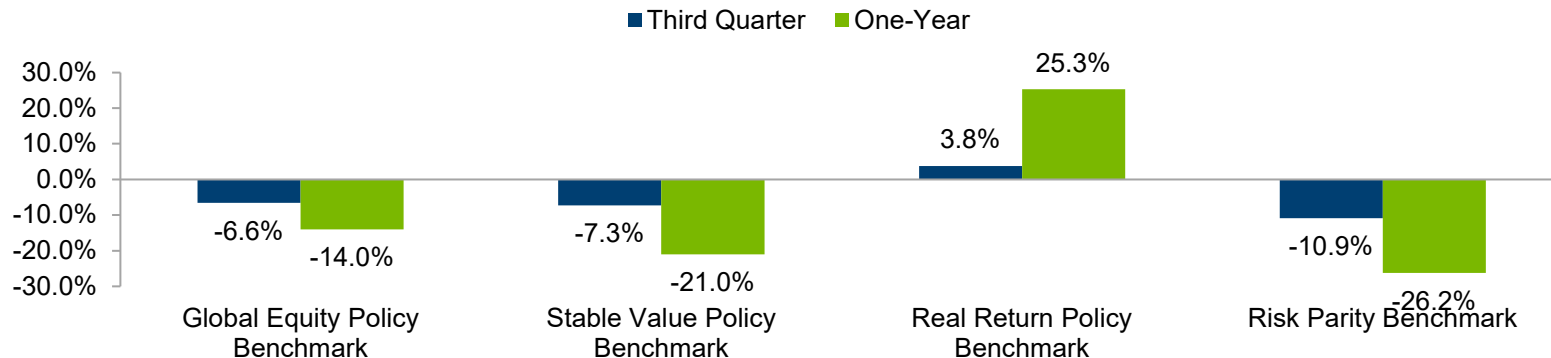
Performance Review: Third Quarter 2022

Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company

Nothing in this document should be construed as legal or investment advice. Please consult with your independent professional for any such advice. To protect the confidential and proprietary information included in this material, it may not be disclosed or provided to any third parties without the approval of Aon.



# Summary

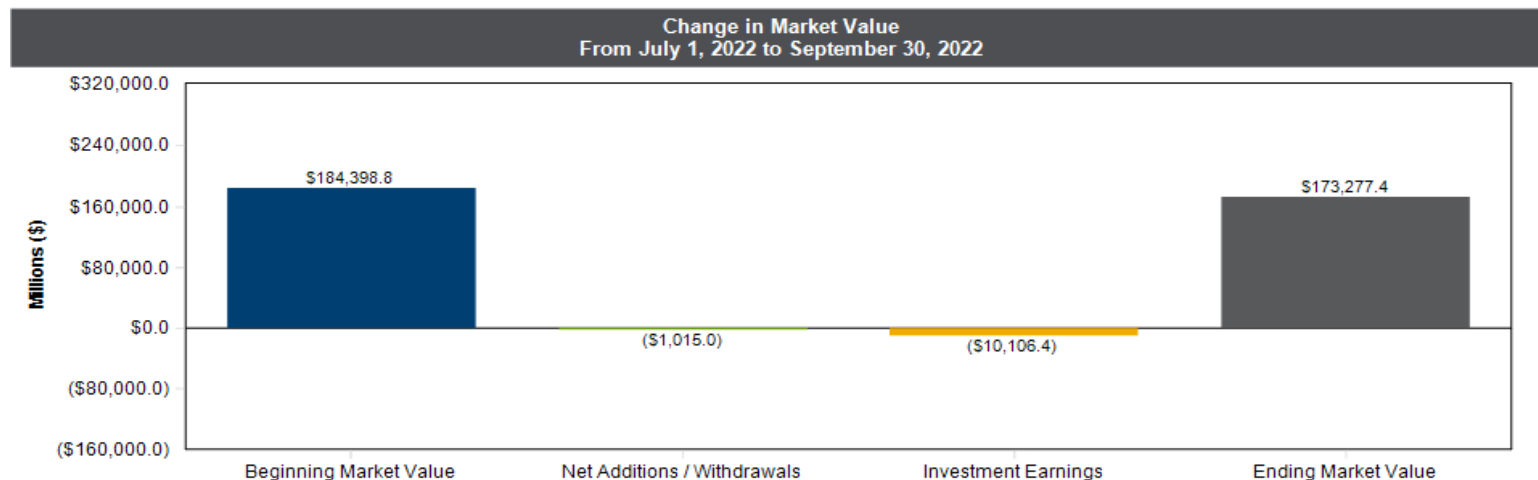


- Challenges in the global investment environment have been both strong and persistent all year so far on the back of rising rates, soaring inflation and geopolitical tensions
- Global equities declined 6.6% for the quarter and 14% for the trailing year
- U.S. Treasury yields saw notable increases across the maturities which moved the yield curve upwards over the quarter. The 10-year Treasury yield was up 85bps to 3.83%, and the 30-year Treasury yield was up 65bps to 3.79% over the quarter.
- TRS returned -5.5% for the quarter which was 0.5 percentage points below its benchmark
  - Underperformance at the asset class level for Global Equity and Real Estate were the primary drivers for relative results.
- For the trailing twelve months, TRS returned -9.9% versus the benchmark return of -10.3%
  - Outperformance from the Stable Value and Risk Parity asset classes were the primary drivers of relative performance

# 1. Market Summary – Third Quarter 2022

|  | Third Quarter | YTD           | One Year      | Three Years | Five Years  | Ten Years   |
|--|---------------|---------------|---------------|-------------|-------------|-------------|
| <b><u>Global Equity:</u></b>                         |               |               |               |             |             |             |
| TF USA Benchmark                                     | -4.5%         | -24.7%        | -17.6%        | 7.9%        | 8.8%        | 11.5%       |
| MSCI EAFE + Canada Index                             | -9.3          | -26.3         | -24.0         | -1.2        | -0.4        | 3.6         |
| MSCI Emerging Markets Index                          | -11.6         | -27.2         | -28.1         | -2.0        | -1.8        | 1.1         |
| HFRI Fund of Funds Composite Index                   | -0.2          | -6.8          | -6.4          | 4.2         | 3.1         | 3.5         |
| State Street Private Equity Index (quarter lagged)   | -4.9          | -0.4          | 6.2           | 19.7        | 16.8        | 14.2        |
| Global Equity Policy Benchmark                       | -6.6          | -18.5         | -14.0         | 7.8         | 7.1         | 8.5         |
| <b><u>Stable Value:</u></b>                          |               |               |               |             |             |             |
| Bloomberg Barclays Long Treasury Index               | -9.6%         | -28.8%        | -26.6%        | -8.5%       | -1.6%       | 0.6%        |
| HFRI Fund of Funds Conservative Index                | 0.3           | -1.3          | -0.6          | 4.7         | 3.8         | 3.7         |
| Absolute Return Benchmark                            | 1.6           | 3.9           | 4.9           | 3.4         | 3.8         | 3.1         |
| 90 Day U.S. Treasury Bill                            | 0.5           | 0.6           | 0.6           | 0.6         | 1.1         | 0.7         |
| Stable Value Policy Benchmark                        | -7.3          | -22.9         | -21.0         | -5.3        | -0.2        | 1.4         |
| <b><u>Real Return:</u></b>                           |               |               |               |             |             |             |
| Bloomberg Barclays U.S. TIPS Index                   | -5.1%         | -13.6%        | -11.6%        | 0.8%        | 2.0%        | 1.0%        |
| NCREIF ODCE (quarter lagged)                         | 4.5           | 20.6          | 28.3          | 11.7        | 9.6         | 10.2        |
| Energy, Natural Resources & Infrastructure Benchmark | 1.9           | 14.3          | 17.6          | 8.6         | 7.6         | --          |
| Goldman Sachs Commodities Index                      | -10.3         | 21.8          | 23.6          | 12.2        | 7.8         | -3.9        |
| Real Return Policy Benchmark                         | 3.8           | 18.8          | 25.3          | 10.8        | 8.7         | 8.0         |
| <b><u>Risk Parity:</u></b>                           |               |               |               |             |             |             |
| Risk Parity Benchmark                                | -10.9%        | -28.3%        | -26.2%        | -3.2%       | 0.9%        | 2.9         |
| <b>TRS Policy Benchmark</b>                          | <b>-5.0%</b>  | <b>-14.5%</b> | <b>-10.3%</b> | <b>5.2%</b> | <b>5.7%</b> | <b>6.9%</b> |

## 2. Market Value Change



| Summary of Cash Flow      |                 |                 |                 |                 |
|---------------------------|-----------------|-----------------|-----------------|-----------------|
|                           | 1<br>Quarter    | 1<br>Year       | 3<br>Years      | 5<br>Years      |
| Beginning Market Value    | 184,398,784,440 | 196,726,883,865 | 157,632,311,142 | 146,326,336,312 |
| + Additions / Withdrawals | -1,014,975,521  | -4,295,242,099  | -12,250,245,170 | -20,516,898,312 |
| + Investment Earnings     | -10,106,365,423 | -19,154,198,271 | 27,895,377,524  | 47,468,005,496  |
| = Ending Market Value     | 173,277,443,496 | 173,277,443,496 | 173,277,443,496 | 173,277,443,496 |



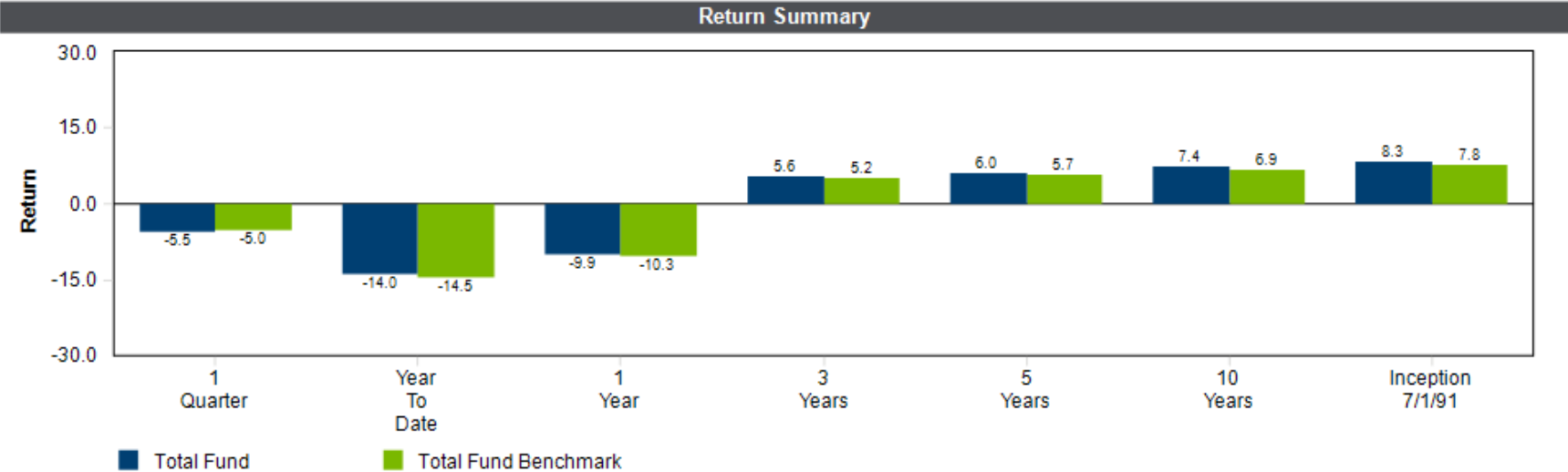
### 3. Asset Allocation Detail

|                                   | Market Value \$ in millions)<br>as of 9/30/2022 |               | Interim<br>Policy<br>Target | Relative to<br>Interim<br>Policy<br>Target | Long<br>Term<br>Policy<br>Target | Long<br>Term<br>Policy<br>Ranges |
|-----------------------------------|---|---------------|-----------------------------|--|----------------------------------|----------------------------------|
|                                   | (\$)  | (%)           |                             |  |                                  |                                  |
| <b>Investment Exposure</b>        | --  | <b>103.4%</b> | <b>104.0%</b>               | <b>-0.6%</b>                               | <b>104.0%</b>                    | <b>99-115%</b>                   |
| Total U.S.A.                      | \$26,488  | 15.3%         | 16.7%                       | -1.4%                                      | 18.0                             | 13-23%                           |
| Non-U.S. Developed                | \$19,587  | 11.3%         | 12.1%                       | -0.8%                                      | 13.0                             | 8-18%                            |
| Emerging Markets                  | \$13,178  | 7.6%          | 8.3%                        | -0.7%                                      | 9.0                              | 4-14%                            |
| Private Equity                    | \$31,426  | 18.1%         | 18.4%                       | -0.3%                                      | 14.0                             | 9-24%*                           |
| <b>Global Equity</b>              | <b>\$90,680</b>                                 | <b>52.3%</b>  | <b>55.5%</b>                | <b>-3.2%</b>                               | <b>54.0</b>                      | <b>47-61%</b>                    |
| Government Bonds                  | \$22,512  | 13.0%         | 14.8%                       | -1.8%                                      | 16.0                             | 0-21%                            |
| Stable Value Hedge Funds          | \$9,460   | 5.5%          | 4.6%                        | +0.9%                                      | 5.0                              | 0-10%                            |
| Absolute Return                   | \$5,320   | 3.1%          | 0.0%                        | -1.5%                                      | 0.0                              | 0-20%                            |
| <b>Stable Value</b>               | <b>\$37,292</b>                                 | <b>21.5%</b>  | <b>19.4%</b>                | <b>+2.1%</b>                               | <b>21.0</b>                      | <b>14-28%</b>                    |
| Real Estate                       | \$29,961  | 17.3%         | 15.7%                       | +1.6%                                      | 15.0                             | 10-20%                           |
| Energy, Natural Resource and Inf. | \$11,389  | 6.6%          | 6.0%                        | +0.6%                                      | 6.0                              | 1-11%                            |
| Commodities                       | \$373   | 0.2%          | 0.0%                        | +0.2%                                      | 0.0                              | 0-5%                             |
| <b>Real Return</b>                | <b>\$41,724</b>                                 | <b>24.1%</b>  | <b>21.7%</b>                | <b>+2.4%</b>                               | <b>21.0</b>                      | <b>14-28%</b>                    |
| Risk Parity                       | \$11,240  | 6.5%          | 7.4%                        | -0.9%                                      | 8.0                              | 0-13%                            |
| <b>Risk Parity</b>                | <b>\$11,240</b>                                 | <b>6.5%</b>   | <b>7.4%</b>                 | <b>-0.9%</b>                               | <b>8.0</b>                       | <b>0-13%</b>                     |
| Cash                              | \$2,477   | 1.4%          | 2.0%                        | -0.6%                                      | 2.0                              | 0-7%                             |
| Asset Allocation Leverage         | -\$10,135                                       | -5.9%         | -6.0%                       | +0.2%                                      | -6.0                             | --                               |
| <b>Net Asset Allocation</b>       | <b>-\$7,658</b>                                 | <b>-4.4%</b>  | <b>-4.0%</b>                | <b>-0.4%</b>                               | <b>-4.0</b>                      | <b>--</b>                        |
| <b>Total Fund</b>                 | <b>\$173,277</b>                                | <b>100.0%</b> |                             | <b>---</b>                                 | <b>100.0%</b>                    | <b>--</b>                        |

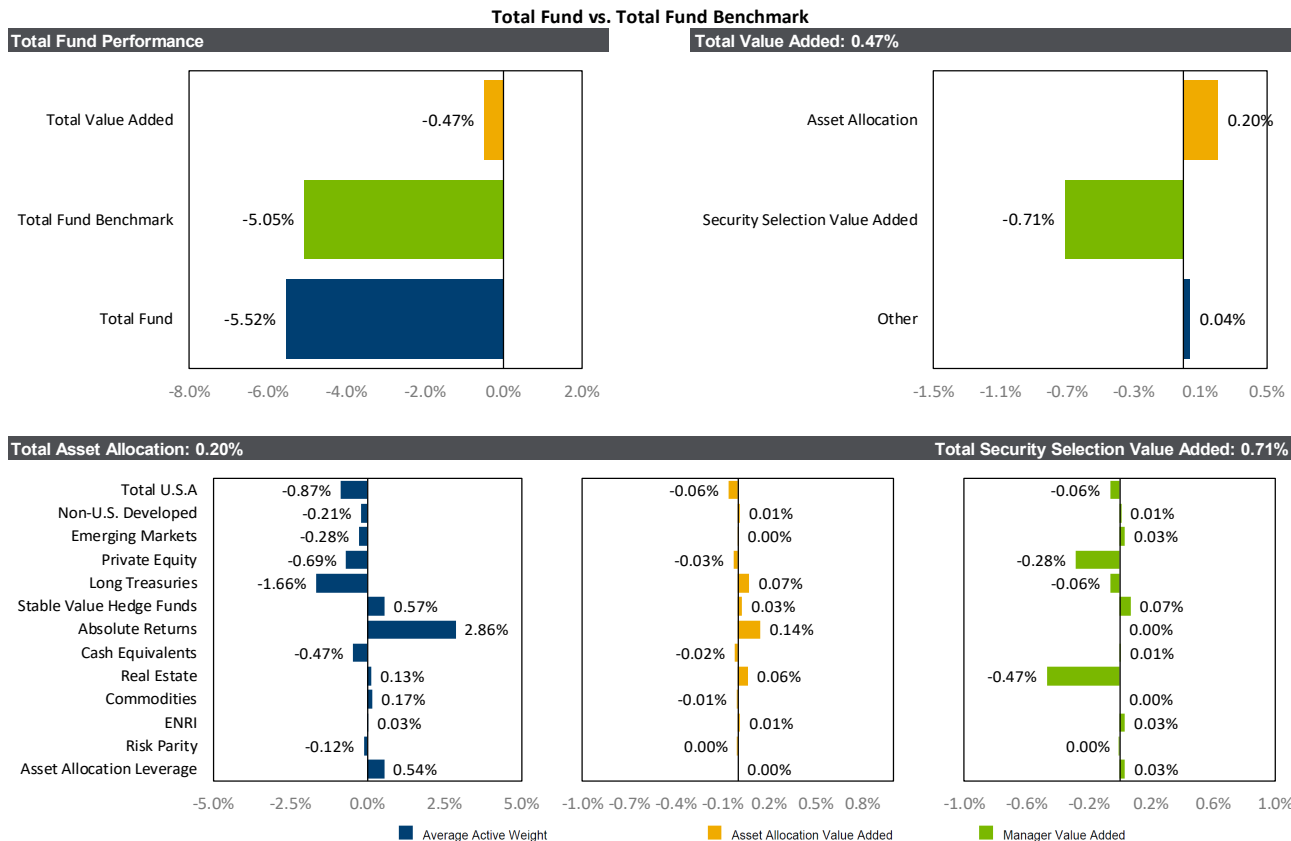
Note: Asset allocation information shown above is based upon MOPAR reporting. The excess returns shown above may not be a perfect difference between the actual and benchmark returns due entirely to rounding.

\*Reverts to 9-19% on 7/31/23

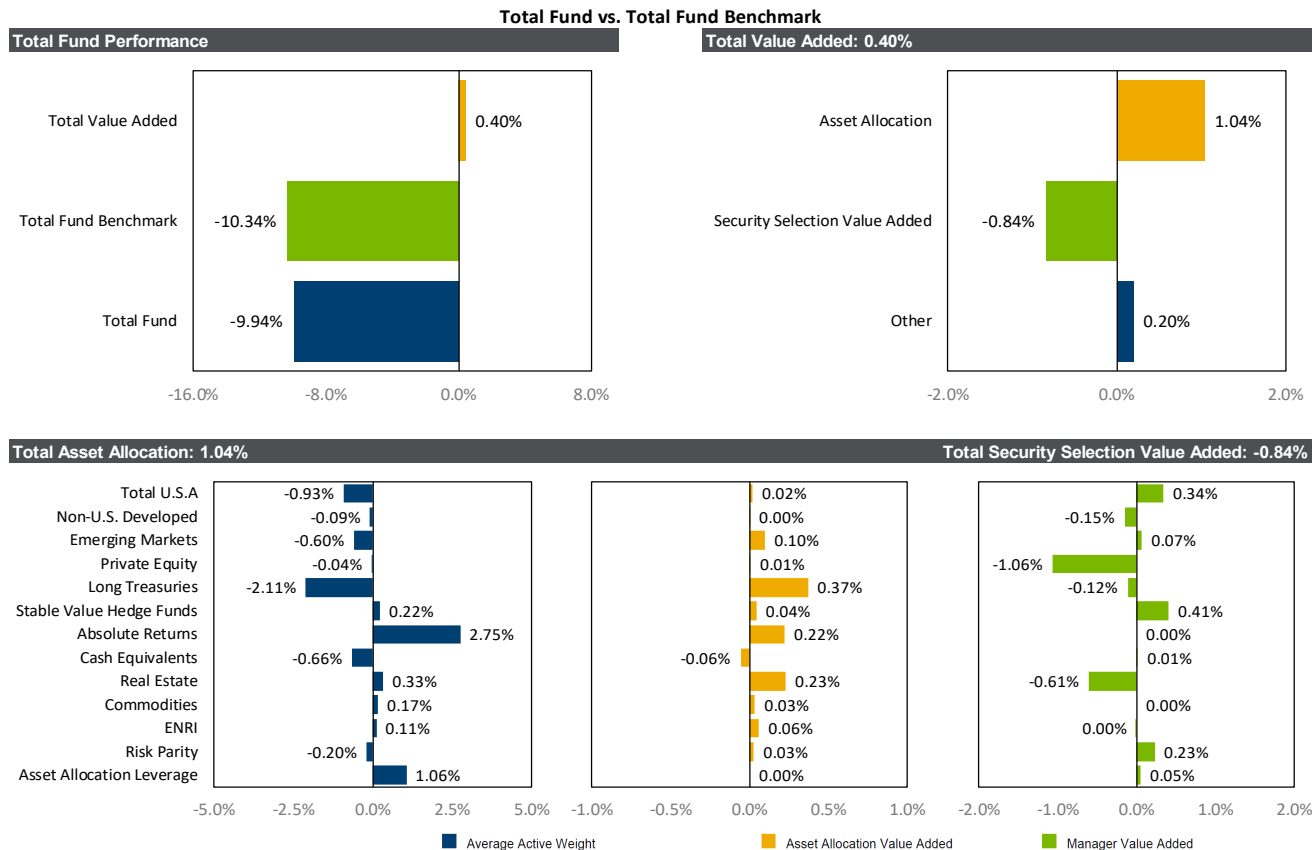
# 4. Total TRS Performance Ending 9/30/2022



# 5. Total Fund Attribution – One Quarter Ending 9/30/2022

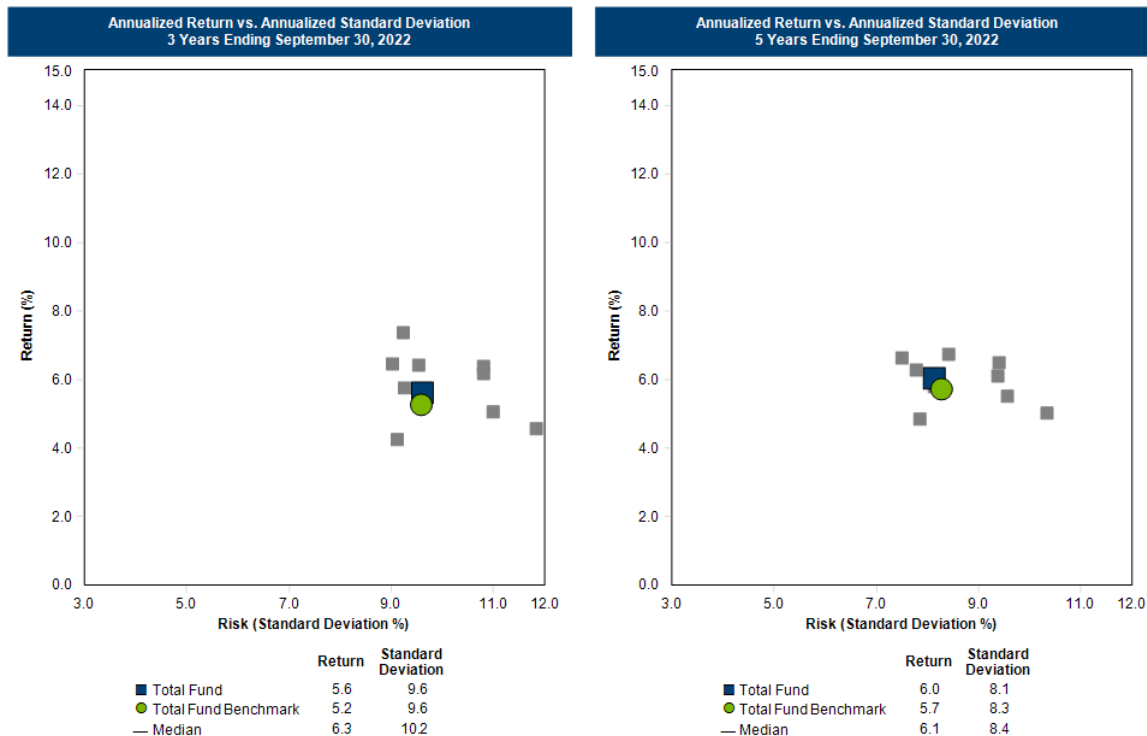


# 5. Total Fund Attribution – One Year Ending 9/30/2022



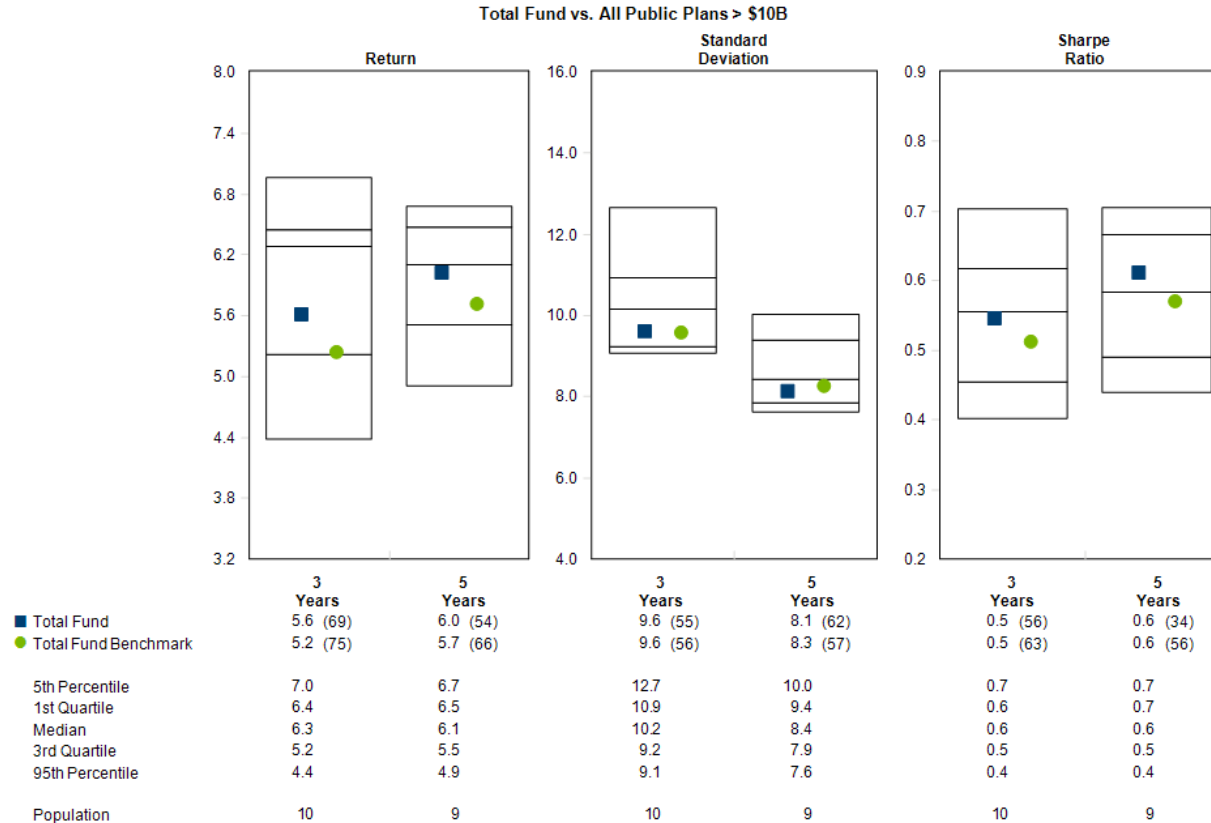
## 6. Risk Profile: Total Fund Risk-Return vs. Peers

All Public Plans > \$10B Total Fund



*Note: Public Plan peer group composed of 10 public funds with total assets in excess of \$10B as of 9/30/2022 respectively for the periods above. An exhibit outlining the asset allocation of the peer portfolios is provided in the appendix of this report.*

## 6. Risk Profile: Trailing 3-Year and 5-Year Risk Metrics Peer Comparison



## 7. IPS Stated Trust Return Objectives Ending 9/30/2022

|                        | Five Years  | Seven Years | Ten Years   | Twenty Years |
|------------------------|-------------|-------------|-------------|--------------|
| <b>Total Fund</b>      | <b>6.0%</b> | <b>7.5%</b> | <b>7.4%</b> | <b>7.8%</b>  |
| Total Fund Benchmark   | 5.7         | 7.1         | 6.9         | 7.5          |
| <i>Difference</i>      | +0.3        | +0.4        | +0.5        | +0.3         |
| <b>Total Fund</b>      | <b>6.0%</b> | <b>7.5%</b> | <b>7.4%</b> | <b>7.8%</b>  |
| Assumed Rate of Return | 7.4         | 7.5         | 7.7         | 7.8          |
| <i>Difference</i>      | -1.4        | 0.0         | -0.3        | 0.0          |
| <b>Total Fund</b>      | <b>6.0%</b> | <b>7.5%</b> | <b>7.4%</b> | <b>7.8%</b>  |
| Inflation + 5%         | 8.8         | 8.2         | 7.5         | 7.5          |
| <i>Difference</i>      | -2.8        | -0.7        | -0.1        | +0.3         |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

## 8. Global Equity: Performance Summary Ending 9/30/2022

|                             | Third Quarter | YTD           | One Year      | Three Years | Five Years  | Ten Years   |
|-----------------------------|---------------|---------------|---------------|-------------|-------------|-------------|
| <b>Total Global Equity</b>  | <b>-7.3%</b>  | <b>-19.0%</b> | <b>-15.2%</b> | <b>7.1%</b> | <b>6.5%</b> | <b>8.4%</b> |
| Global Equity Benchmark     | -6.6          | -18.5         | -14.0         | 7.8         | 7.1         | 8.5         |
| <i>Difference</i>           | <i>-0.7</i>   | <i>-0.5</i>   | <i>-1.2</i>   | <i>-0.7</i> | <i>-0.6</i> | <i>-0.1</i> |
| <b>Total U.S. Equity</b>    | <b>-4.8</b>   | <b>-22.5</b>  | <b>-15.7</b>  | <b>7.1</b>  | <b>7.5</b>  | <b>10.2</b> |
| Total U.S. Equity Benchmark | -4.5          | -24.7         | -17.6         | 7.9         | 8.8         | 11.5        |
| <i>Difference</i>           | <i>-0.3</i>   | <i>+2.2</i>   | <i>+1.9</i>   | <i>-0.8</i> | <i>-1.3</i> | <i>-1.3</i> |
| <b>Non-U.S. Equity</b>      | <b>-10.0</b>  | <b>-26.9</b>  | <b>-25.9</b>  | <b>-0.9</b> | <b>-0.5</b> | <b>3.3</b>  |
| Non-U.S. Benchmark          | -10.1         | -26.6         | -25.6         | -1.4        | -0.8        | 2.7         |
| <i>Difference</i>           | <i>+0.1</i>   | <i>-0.3</i>   | <i>-0.3</i>   | <i>+0.5</i> | <i>+0.3</i> | <i>+0.6</i> |
| <b>Non-U.S. Developed</b>   | <b>-9.2</b>   | <b>-27.0</b>  | <b>-25.0</b>  | <b>-1.2</b> | <b>-0.5</b> | <b>4.1</b>  |
| MSCI EAFE + Canada          | -9.3          | -26.3         | -24.0         | -1.2        | -0.4        | 3.6         |
| <i>Difference</i>           | <i>+0.1</i>   | <i>-0.7</i>   | <i>-1.0</i>   | <i>0.0</i>  | <i>-0.1</i> | <i>+0.5</i> |
| <b>Emerging Markets</b>     | <b>-11.2</b>  | <b>-26.8</b>  | <b>-27.4</b>  | <b>-0.8</b> | <b>-0.6</b> | <b>2.2</b>  |
| MSCI Emerging Markets       | -11.6         | -27.2         | -28.1         | -2.0        | -1.8        | 1.1         |
| <i>Difference</i>           | <i>+0.4</i>   | <i>+0.4</i>   | <i>+0.7</i>   | <i>+1.2</i> | <i>+1.2</i> | <i>+1.1</i> |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*



## 8. Global Equity: Performance Summary Ending 9/30/2022 (cont'd)

|                             | Third Quarter | YTD           | One Year      | Three Years | Five Years  | Ten Years   |
|-----------------------------|---------------|---------------|---------------|-------------|-------------|-------------|
| <b>Total Public Equity</b>  | <b>-7.8%</b>  | <b>-25.0%</b> | <b>-21.5%</b> | <b>2.5%</b> | <b>2.9%</b> | <b>6.1%</b> |
| Public Equity Benchmark     | -7.6          | -25.7         | -22.0         | 2.8         | 3.4         | 6.3         |
| <i>Difference</i>           | <i>-0.2</i>   | <i>+0.7</i>   | <i>+0.5</i>   | <i>-0.3</i> | <i>-0.5</i> | <i>-0.2</i> |
| <b>Total Private Equity</b> | <b>-6.5</b>   | <b>-5.1</b>   | <b>-0.6</b>   | <b>18.0</b> | <b>15.5</b> | <b>15.1</b> |
| Private Equity Benchmark    | -4.9          | -0.4          | 6.2           | 19.7        | 16.8        | 14.2        |
| <i>Difference</i>           | <i>-1.6</i>   | <i>-4.7</i>   | <i>-6.8</i>   | <i>-1.7</i> | <i>-1.3</i> | <i>+0.9</i> |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

## 9. Stable Value: Performance Summary Ending 9/30/2022

|                                 | Third<br>Quarter | YTD           | One<br>Year   | Three<br>Years | Five<br>Years | Ten<br>Years |
|---------------------------------|------------------|---------------|---------------|----------------|---------------|--------------|
| <b>Total Stable Value</b>       | <b>-6.0%</b>     | <b>-18.6%</b> | <b>-16.6%</b> | <b>-2.8%</b>   | <b>1.3%</b>   | <b>2.9%</b>  |
| Total Stable Value Benchmark    | -7.3             | -22.9         | -21.0         | -5.3           | -0.2          | 1.4          |
| <i>Difference</i>               | <i>+1.3</i>      | <i>+4.3</i>   | <i>+4.4</i>   | <i>+2.5</i>    | <i>+1.5</i>   | <i>+1.5</i>  |
| <b>Total Government Bonds</b>   | <b>-10.1</b>     | <b>-29.5</b>  | <b>-27.4</b>  | <b>-9.0</b>    | <b>-1.6</b>   | <b>0.8</b>   |
| Treasury Benchmark              | -9.6             | -28.8         | -26.6         | -8.5           | -1.6          | 0.6          |
| <i>Difference</i>               | <i>-0.5</i>      | <i>-0.7</i>   | <i>-0.8</i>   | <i>-0.5</i>    | <i>0.0</i>    | <i>+0.2</i>  |
| <b>Stable Value Hedge Funds</b> | <b>1.5</b>       | <b>6.4</b>    | <b>8.2</b>    | <b>8.6</b>     | <b>6.6</b>    | <b>5.8</b>   |
| Hedge Funds Benchmark           | 0.3              | -1.3          | -0.6          | 4.7            | 3.8           | 3.7          |
| <i>Difference</i>               | <i>+1.2</i>      | <i>+7.7</i>   | <i>+8.8</i>   | <i>+3.9</i>    | <i>+2.8</i>   | <i>+2.1</i>  |
| <b>Absolute Return</b>          | <b>-0.1</b>      | <b>-2.7</b>   | <b>-2.6</b>   | <b>5.9</b>     | <b>6.4</b>    | <b>7.7</b>   |
| Absolute Return Benchmark       | 1.6              | 3.9           | 4.9           | 3.4            | 3.8           | 3.1          |
| <i>Difference</i>               | <i>-1.7</i>      | <i>-6.6</i>   | <i>-7.5</i>   | <i>+2.5</i>    | <i>+2.6</i>   | <i>+4.6</i>  |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

## 10. Real Return: Performance Summary Ending 9/30/2022

|  | Third Quarter | YTD          | One Year     | Three Years  | Five Years   | Ten years   |
|--|---------------|--------------|--------------|--------------|--------------|-------------|
| <b>Total Real Return</b>                           | <b>2.0%</b>   | <b>15.2%</b> | <b>22.9%</b> | <b>12.3%</b> | <b>10.5%</b> | <b>9.1%</b> |
| Real Return Benchmark                              | 3.8           | 18.8         | 25.3         | 10.8         | 8.7          | 8.0         |
| <i>Difference</i>                                  | <i>-1.8</i>   | <i>-3.6</i>  | <i>-2.4</i>  | <i>+1.5</i>  | <i>+1.8</i>  | <i>+1.1</i> |
| <b>Real Estate</b>                                 | <b>1.9</b>    | <b>15.6</b>  | <b>24.9</b>  | <b>14.1</b>  | <b>12.3</b>  | <b>12.3</b> |
| Real Estate Benchmark                              | 4.5           | 20.6         | 28.3         | 11.7         | 9.6          | 10.2        |
| <i>Difference</i>                                  | <i>-2.6</i>   | <i>-5.0</i>  | <i>-3.4</i>  | <i>+2.4</i>  | <i>+2.7</i>  | <i>+2.1</i> |
| <b>Energy, Natural Resource and Infrastructure</b> | <b>2.7</b>    | <b>14.6</b>  | <b>18.3</b>  | <b>7.8</b>   | <b>7.6</b>   | <b>--</b>   |
| Energy and Natural Res. Benchmark                  | 1.9           | 14.3         | 17.6         | 8.6          | 7.6          | --          |
| <i>Difference</i>                                  | <i>+0.8</i>   | <i>+0.3</i>  | <i>+0.7</i>  | <i>-0.8</i>  | <i>0.0</i>   | <i>--</i>   |
| <b>Commodities</b>                                 | <b>-10.2</b>  | <b>-2.2</b>  | <b>7.9</b>   | <b>13.5</b>  | <b>1.6</b>   | <b>-9.0</b> |
| Commodities Benchmark                              | -10.3         | 21.8         | 23.6         | 12.2         | 7.8          | -3.9        |
| <i>Difference</i>                                  | <i>+0.1</i>   | <i>-24.0</i> | <i>-15.7</i> | <i>+1.3</i>  | <i>-6.2</i>  | <i>-5.1</i> |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

## 11. Risk Parity: Performance Summary Ending 9/30/2022

|                          | Third Quarter | YTD           | One Year      | Three Years  | Five Years  | Ten Years   |
|--------------------------|---------------|---------------|---------------|--------------|-------------|-------------|
| <b>Total Risk Parity</b> | <b>-10.9%</b> | <b>-27.0%</b> | <b>-23.6%</b> | <b>-4.4%</b> | <b>0.4%</b> | <b>2.4%</b> |
| Risk Parity Benchmark    | -10.9         | -28.3         | -26.2         | -3.2         | 0.9         | 2.9         |
| <i>Difference</i>        | <i>0.0</i>    | <i>+1.3</i>   | <i>+2.6</i>   | <i>-1.2</i>  | <i>-0.5</i> | <i>-0.5</i> |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

## 12.Cash Equivalents: Performance Summary Ending 9/30/2022

|                         | Third Quarter | YTD         | One Year    | Three Years | Five Years  | Ten Years   |
|-------------------------|---------------|-------------|-------------|-------------|-------------|-------------|
| <b>Cash Equivalents</b> | <b>0.8%</b>   | <b>1.6%</b> | <b>1.7%</b> | <b>1.2%</b> | <b>1.5%</b> | <b>1.9%</b> |
| Cash Benchmark          | 0.5           | 0.6         | 0.6         | 0.6         | 1.1         | 0.7         |
| <i>Difference</i>       | <i>+0.3</i>   | <i>+1.0</i> | <i>+1.1</i> | <i>+0.6</i> | <i>+0.4</i> | <i>+1.2</i> |

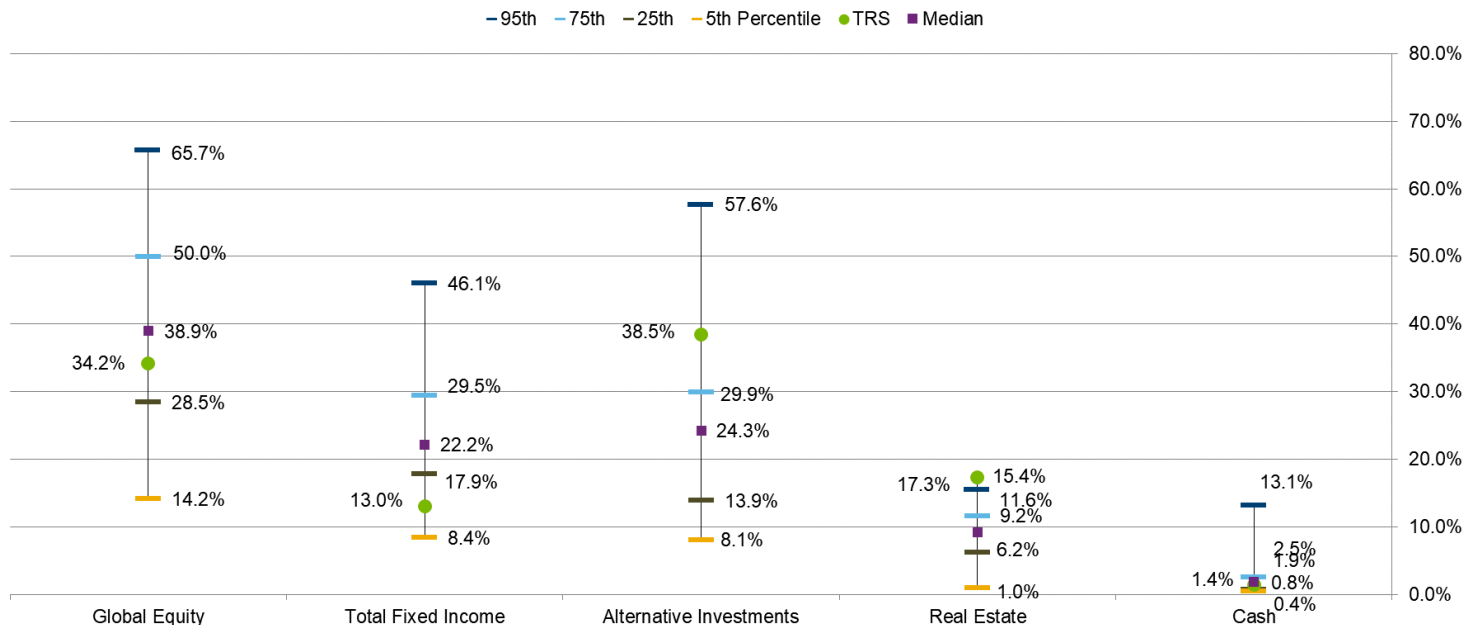
*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*



# Appendix – Supplemental Reporting

# TRS Commitment Levels vs. Peers (>\$10 Billion) as of 9/30/2022

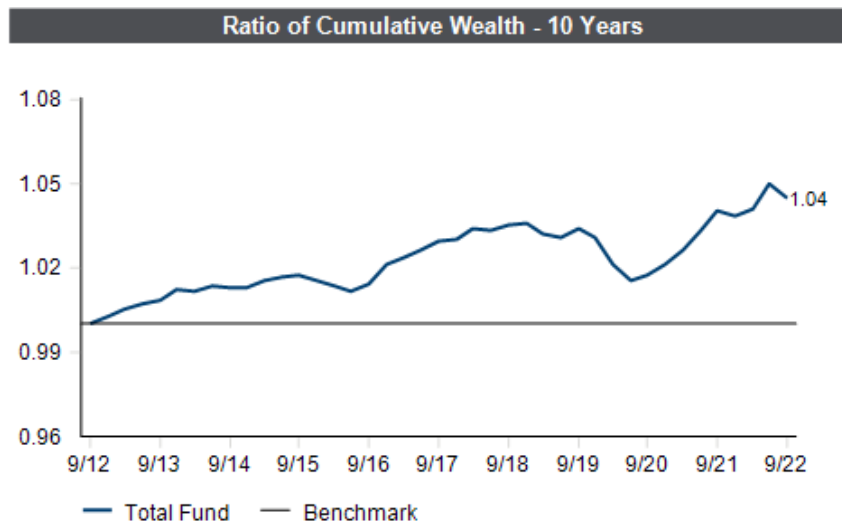
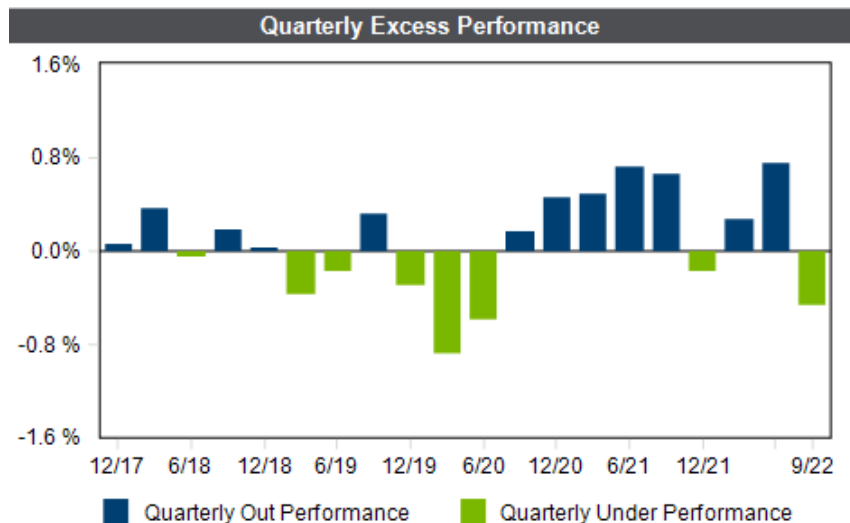
- The chart below depicts the asset allocation of peer public funds with assets greater than \$10 billion.
  - The ends of each line represent the 95<sup>th</sup> and 5<sup>th</sup> percentile of exposures, the middle light blue and grey lines represent the 25<sup>th</sup> and 75<sup>th</sup> percentile of exposures, the purple square represents the median, and the green dot represents TRS exposure.



Note: The Public Plan peer universe had 13 observations for the second quarter 2022. TRS allocations may not sum to 100.0% which is entirely due to the impact of rounding

# Historical Excess Performance Ending 9/30/2022

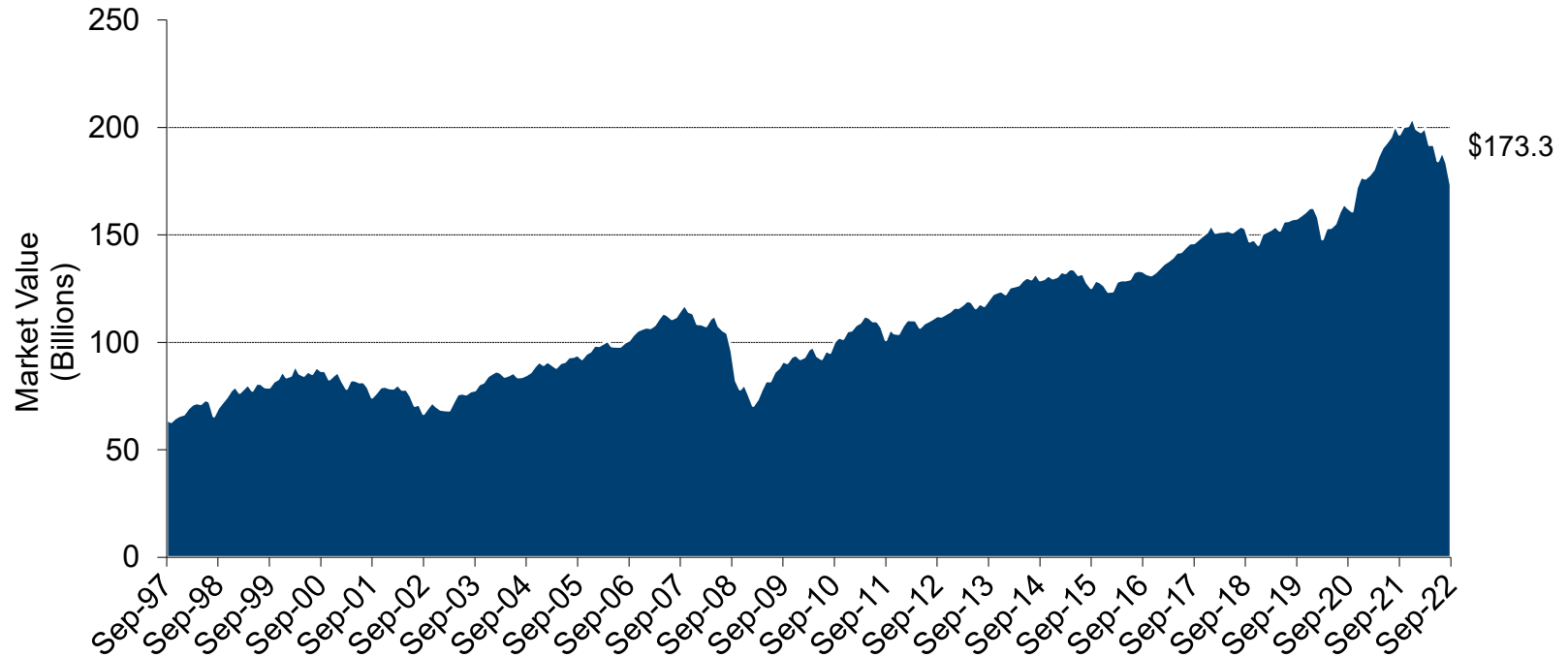
## Quarterly and Cumulative Excess Performance Total Fund vs. Total Fund Benchmark





# TRS Asset Growth

Total Fund Historical Growth (September 1997 - September 2022)



# External Manager Program: Public Equity Performance as of 9/30/2022

|                                    | Allocation<br>(\$ in<br>billions) | Third<br>Quarter | YTD           | One<br>Year   | Three<br>Years |
|------------------------------------|-----------------------------------|------------------|---------------|---------------|----------------|
| <b>EP Total Global Equity</b>      | <b>\$24.4</b>                     | <b>-6.9%</b>     | <b>-23.6%</b> | <b>-20.9%</b> | <b>5.2%</b>    |
| EP Global Equity Benchmark         | --                                | -7.5             | -25.4         | -21.7         | 3.3            |
| <i>Difference</i>                  | --                                | +0.6             | +1.8          | +0.8          | +1.9           |
| <b>EP U.S.A.</b>                   | <b>\$9.2</b>                      | <b>-4.4</b>      | <b>-20.9</b>  | <b>-15.1</b>  | <b>9.1</b>     |
| EP U.S.A. Benchmark                | --                                | -4.5             | -24.7         | -17.6         | 7.9            |
| <i>Difference</i>                  | --                                | +0.1             | +3.8          | +2.5          | +1.2           |
| <b>EP Non-U.S. Developed</b>       | <b>\$4.7</b>                      | <b>-8.4</b>      | <b>-27.9</b>  | <b>-28.1</b>  | <b>1.1</b>     |
| MSCI EAFE + Canada Policy Index    | --                                | -9.3             | -26.3         | -24.0         | -1.2           |
| <i>Difference</i>                  | --                                | +0.9             | -1.6          | -4.1          | +2.3           |
| <b>EP Emerging Markets</b>         | <b>\$5.1</b>                      | <b>-11.4</b>     | <b>-25.3</b>  | <b>-26.4</b>  | <b>1.7</b>     |
| MSCI Emerging Markets Policy Index | --                                | -11.6            | -27.2         | -28.1         | -2.0           |
| <i>Difference</i>                  | --                                | +0.2             | +1.9          | +1.7          | +3.7           |
| <b>EP World Equity</b>             | <b>\$5.4</b>                      | <b>-5.3</b>      | <b>-22.3</b>  | <b>-17.2</b>  | <b>7.0</b>     |
| EP World Equity Benchmark          | --                                | -6.6             | -25.4         | -20.7         | 4.2            |
| <i>Difference</i>                  | --                                | +1.3             | +3.1          | +3.5          | +2.8           |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

# External Manager Program: Stable Value/Total Program Performance as of 9/30/2022

|                                       | Allocation<br>(\$ in<br>billions) | Third<br>Quarter | YTD          | One Year     | Three<br>Years |
|---------------------------------------|-----------------------------------|------------------|--------------|--------------|----------------|
| <b>EP Total Stable Value</b>          | <b>\$9.5</b>                      | <b>1.5%</b>      | <b>6.4%</b>  | <b>8.2%</b>  | <b>8.6%</b>    |
| EP Stable Value Benchmark             | --                                | 0.3              | -1.3         | -0.6         | 4.8            |
| <i>Difference</i>                     | --                                | +1.2             | +7.7         | +8.8         | +3.8           |
| <b>EP Stable Value Hedge Funds</b>    | <b>\$9.5</b>                      | <b>1.5%</b>      | <b>6.4%</b>  | <b>8.2%</b>  | <b>8.6%</b>    |
| EP Stable Value Hedge Funds Benchmark | --                                | 0.3              | -1.3         | -0.6         | 4.8            |
| <i>Difference</i>                     | --                                | +1.2             | +7.7         | +8.8         | +3.8           |
| <b>Total External Public Program</b>  | <b>\$40.0</b>                     | <b>-5.3</b>      | <b>-18.2</b> | <b>-15.5</b> | <b>5.3</b>     |
| EP External Public Benchmark          | --                                | -5.9             | -20.7        | -17.5        | 3.1            |
| <i>Difference</i>                     | --                                | +0.6             | +2.5         | +2.0         | +2.2           |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

# Public Strategic Partnership Program (SPN): Performance Summary as of 9/30/2022

The Public SPNs in aggregate outperformed the benchmark during the second quarter, as well as over the trailing one-, three-, and five-year trailing periods.

|                                     | Allocation<br>(\$ in<br>billions) | Third<br>Quarter | YTD           | One<br>Year   | Three<br>Years | Five<br>Years |
|-------------------------------------|-----------------------------------|------------------|---------------|---------------|----------------|---------------|
| <b>Public Strategic Partnership</b> | <b>\$6.2</b>                      | <b>-8.3%</b>     | <b>-25.9%</b> | <b>-22.9%</b> | <b>1.1%</b>    | <b>2.9%</b>   |
| Public SPN Benchmark                | --                                | -8.1%            | -26.3%        | -23.0%        | -0.1%          | 2.3%          |
| <i>Difference</i>                   | --                                | -0.2             | +0.4          | +0.1          | +1.2           | +0.6          |
| <b>Blackrock</b>                    | <b>\$2.1</b>                      | <b>-7.4%</b>     | <b>-24.5%</b> | <b>-21.4%</b> | <b>1.5%</b>    | <b>3.8%</b>   |
| <b>J.P. Morgan</b>                  | <b>\$2.2</b>                      | <b>-7.9%</b>     | <b>-26.4%</b> | <b>-23.0%</b> | <b>1.8%</b>    | <b>2.9%</b>   |
| <b>Morgan Stanley</b>               | <b>\$1.9</b>                      | <b>-9.8%</b>     | <b>-26.9%</b> | <b>-24.6%</b> | <b>-0.4%</b>   | <b>2.1%</b>   |

*Note: The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

# Benchmarks

---

- Total Fund Performance Benchmark – 16.7% MSCI U.S.A. IMI, 12.1% MSCI EAFE plus Canada Index, 8.3% MSCI Emerging Markets Index, 18.4% State Street Private Equity Index (1 quarter lagged), 14.8% Blmb. Barc. Long Term Treasury Index, 4.6% HFRI FoF Conservative Index, 2.0% Citigroup 3 Mo. T-Bill Index, 15.7% NCREIF ODCE Index (1 quarter lagged), 6.0% Energy and Natural Resources Benchmark, 7.4% Risk Parity Benchmark, and -6.0% Asset Allocation Leverage Benchmark.
- Global Equity Benchmark – 30.1% MSCI U.S.A. IMI, 21.8% MSCI EAFE plus Canada Index, 14.9% MSCI Emerging Markets Index, and 33.2% State Street Private Equity Index (1 quarter lagged)
  - TF U.S. Equity Benchmark - MSCI U.S.A. Investable Markets Index (IMI)
  - Emerging Markets Equity Benchmark – MSCI Emerging Markets Index
  - Non-US Developed Equity Benchmark– MSCI EAFE + Canada Index
  - Private Equity Benchmark - State Street Private Equity Index (1 quarter lagged)

*Note: Returns and market values (based on account level) reported are provided by State Street. Net additions/withdrawals are reported on a gross (adjusted for expenses) total fund level as provided by State Street. All rates of return for time periods greater than one year are annualized. The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

## Benchmarks (cont'd)

---

- Stable Value Benchmark – 76.4% Blmb. Barc. Long Term Treasury Index and 23.6% HFRI FoF Conservative Index
  - US Treasuries Benchmark – Bloomberg Barclays Long Term Treasury Index
  - Stable Value Hedge Funds – HFRI Fund of Funds (FoF) Conservative Index
  - Absolute Return Benchmark - SOFR + 4%
  
- Real Return Benchmark – 72.4% NCREIF ODCE Index and 27.6% Energy & Natural Resources Benchmark
  - Real Estate Benchmark – NCREIF ODCE Index (1 quarter lagged)
  - Energy and Natural Resources Benchmark – 75% Cambridge Associates Natural Resources Index (reweighted) and 25% quarterly Seasonally-Adjusted Consumer Price Index (1 quarter lagged)
  - Commodities Benchmark – Goldman Sachs Commodity Index
  
- Risk Parity Benchmark – 100% HFR Risk Parity Vol 12 Institutional Index

*Note: Returns and market values (based on account level) reported are provided by State Street. Net additions/withdrawals are reported on a gross (adjusted for expenses) total fund level as provided by State Street. All rates of return for time periods greater than one year are annualized. The excess returns shown in this presentation may differ from State Street statements due entirely to rounding. These differences are generally within a few basis points and are not material.*

# Description of Performance Attribution

- A measure of the source of the deviation of a fund's performance from that of its policy benchmark. Each bar on the attribution graph represents the contribution made by the asset class to the total difference in performance. A positive value for a component indicates a positive contribution to the aggregate relative performance. A negative value indicates a detrimental impact. The magnitude of each component's contribution is a function of (1) the performance of the component relative to its benchmark, and (2) the weight (beginning of period) of the component in the aggregate.
- The individual Asset Class effect, also called **Selection Effect**, is calculated as  
$$\text{Actual Weight of Asset Class} \times (\text{Actual Asset Class Return} - \text{Asset Class Benchmark Return})$$
- The bar labeled **Allocation Effect** illustrates the effect that a Total Fund's asset allocation has on its relative performance.  
$$\text{Allocation Effect calculation} = (\text{Asset Class Benchmark Return} - \text{Total Benchmark Return}) \times (\text{Actual Weight of Asset Class} - \text{Target Policy Weight of Asset Class})$$
- The bar labeled **Other** is a combination of Cash Flow Effect and Benchmark Effect:
  - **Cash Flow Effect** describes the impact of asset movements on the Total Fund results. 
$$\text{Cash Flow Effect calculation} = (\text{Total Fund Actual Return} - \text{Total Fund Policy Return}) - \text{Current Selection Effect} - \text{Current Allocation Effect}$$
  - **Benchmark Effect** results from the weighted average return of the asset classes' benchmarks being different from the Total Funds' policy benchmark return. 
$$\text{Benchmark Effect calculation} = \text{Total Fund Policy Return} - (\text{Asset Class Benchmark Return} \times \text{Target Policy Weight of Asset Class})$$
- **Cumulative Effect**  
$$\text{Cumulative Effect calculation} = \text{Current Effect } t \times (1 + \text{Cumulative Total Fund Actual Return } t-1) + \text{Cumulative Effect } t-1 \times (1 + \text{Total Fund Benchmark Return } t)$$



# Disclaimers and Notes



# Disclaimers and Notes

---

## Disclaimers:

- Please review this report and notify Aon Investments USA Inc. (Aon) with any issues or questions you may have with respect to investment performance or any other matter set forth herein.
- The client portfolio data presented in this report have been obtained from the custodian. Aon has compared this information to the investment managers' reported returns and believes the information to be accurate. Aon has not conducted additional audits and cannot warrant its accuracy or completeness. This document is not intended to provide, and shall not be relied upon for, accounting and legal or tax advice.
- Refer to Hedge Fund Research, Inc. [www.hedgefundresearch.com](http://www.hedgefundresearch.com) for more information on HFR indices

## Notes:

- The rates of return contained in this report are shown on an after-fees basis unless otherwise noted. They are geometric and time weighted. Returns for periods longer than one year are annualized.
- Universe percentiles are based upon an ordering system in which 1 is the best ranking and 100 is the worst ranking.
- Due to rounding throughout the report, percentage totals displayed may not sum up to 100.0%. Additionally, individual fund totals in dollar terms may not sum up to the plan totals.

## Legal Disclosures and Disclaimers

---

Investment advice and consulting services provided by Aon Investments USA Inc. The information contained herein is given as of the date hereof and does not purport to give information as of any other date. The delivery at any time shall not, under any circumstances, create any implication that there has been a change in the information set forth herein since the date hereof or any obligation to update or provide amendments hereto.

This document is not intended to provide, and shall not be relied upon for, accounting, legal or tax advice. Any accounting, legal, or taxation position described in this presentation is a general statement and shall only be used as a guide. It does not constitute accounting, legal, and tax advice and is based on Aon Investments' understanding of current laws and interpretation.

Aon Investments disclaims any legal liability to any person or organization for loss or damage caused by or resulting from any reliance placed on that content. Aon Investments reserves all rights to the content of this document. No part of this document may be reproduced, stored, or transmitted by any means without the express written consent of Aon Investments.

Aon Investments USA Inc. is a federally registered investment advisor with the U.S. Securities and Exchange Commission. Aon Investments is also registered with the Commodity Futures Trading Commission as a commodity pool operator and a commodity trading advisor, and is a member of the National Futures Association. The Aon Investments ADV Form Part 2A disclosure statement is available upon written request to:

Aon Investments USA Inc.  
200 E. Randolph Street  
Suite 700  
Chicago, IL 60601  
ATTN: Aon Investments Compliance Officer

© Aon plc 2020. All rights reserved.

Annual Update to the Board:

# Trading

Jaime Llano, Senior Director

December 2022



# Trading Group

18

Years of average  
investment  
experience

3

MBAs

2

CFAs

2

CAIAs



**Steve Peterson, CFA, CAIA**  
**Director**  
**US Equity**  
*MBA, California Lutheran University*  
*14 years TRS*  
*27 years experience*



**Don Stanley**  
**Investment Manager**  
**Global Equity - Asia**  
*BBA, UT Austin*  
*9 years TRS*  
*14 years experience*



**Jaime Llano**  
**Senior Director**  
**Futures and Currency**  
*MBA, Finance, St. Edwards*  
*17 years TRS*  
*23 years experience*



**Demetrius Pope**  
**Director**  
**Global Equity - Europe**  
*BBA, Sam Houston*  
*16 years TRS*  
*22 years experience*



**Andrew Moynihan**  
**Associate**  
*MBA, Boston College*  
*4 years TRS*  
*9 years experience*



**Maribel Nesuda**  
**Administrative Assistant**  
**Team Support**  
*12 years TRS*  
*27 years experience*



**Sean Letcher, CFA FRM**  
**CAIA CMT**  
**Investment Manager**  
**US Equity and Futures**  
*BS, Business, Texas A & M*  
*10 years TRS*  
*15 years experience*



**Brandon Bilton**  
**Senior Trading Analyst**  
*BBA, Prairie View A & M*  
*5 years TRS*  
*5 years experience*

# Trading Mandate

---

## Implementation

- **Total Trust Execution:** Global execution across multiple asset classes totaled \$344.2 billion over past 12 months
  - **Network:** Manage a global network of 45 brokerage firms
  - **Performance:** Outperformed the median peer equity trading desk by 7.3 basis points over past 12 months, placing us in the 2<sup>nd</sup> quartile
- 

## Index Management

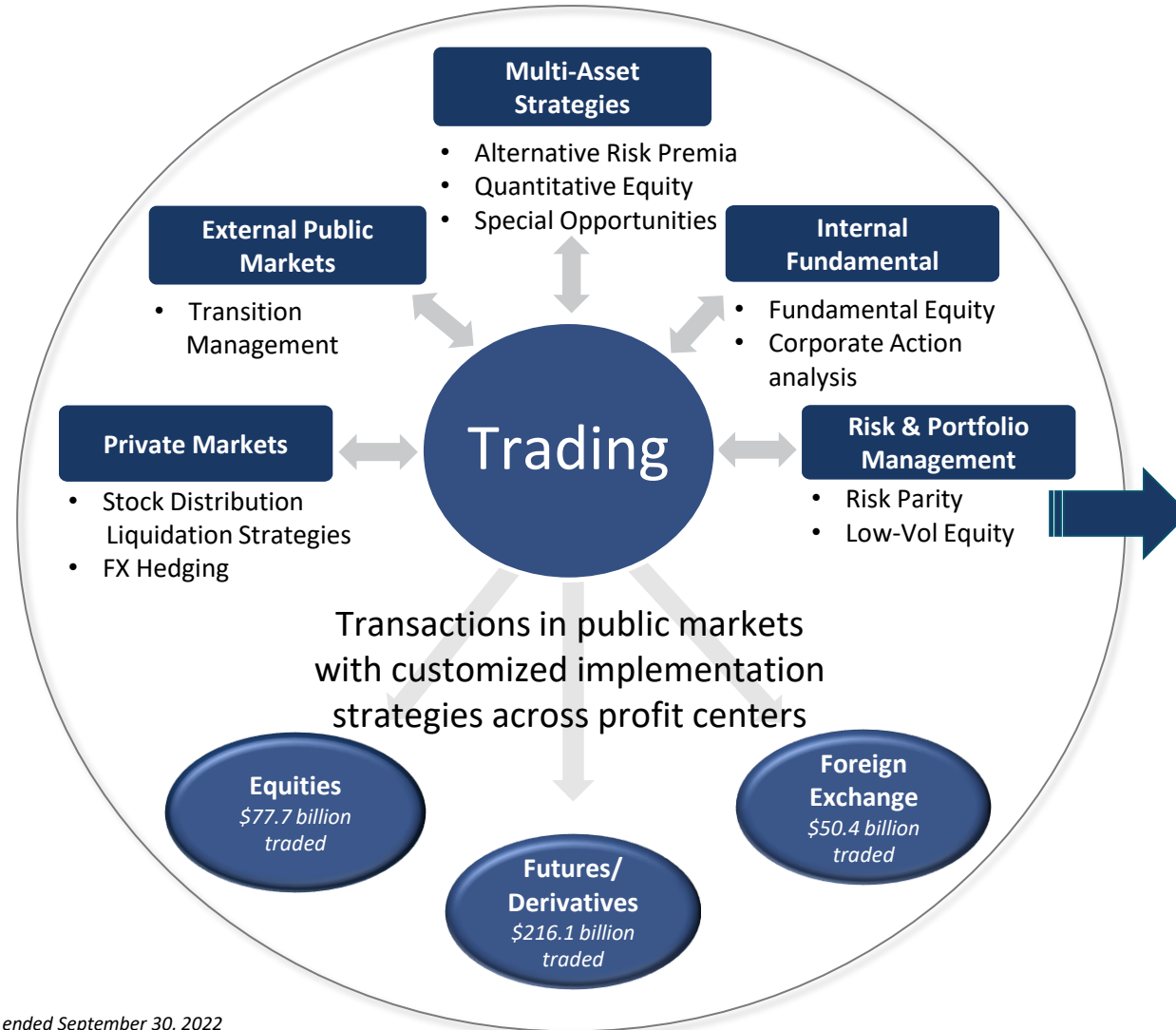
- **Index Portfolio:** Manage U.S., EAFE+Canada, and Emerging Markets Passive Equity Portfolios which totaled \$8.2 billion as of 9/30/22
  - **Full Replication:** Benchmark indices are fully replicated in the portfolio in real-time to achieve tight tracking error and in-line performance
- 

## Market Intelligence

- **Collaboration:** Collaborate across the IMD to provide implementation solutions
- **Committees:** IMD Management Committee, Diversity Council, Ambassadors

# Whom We Serve

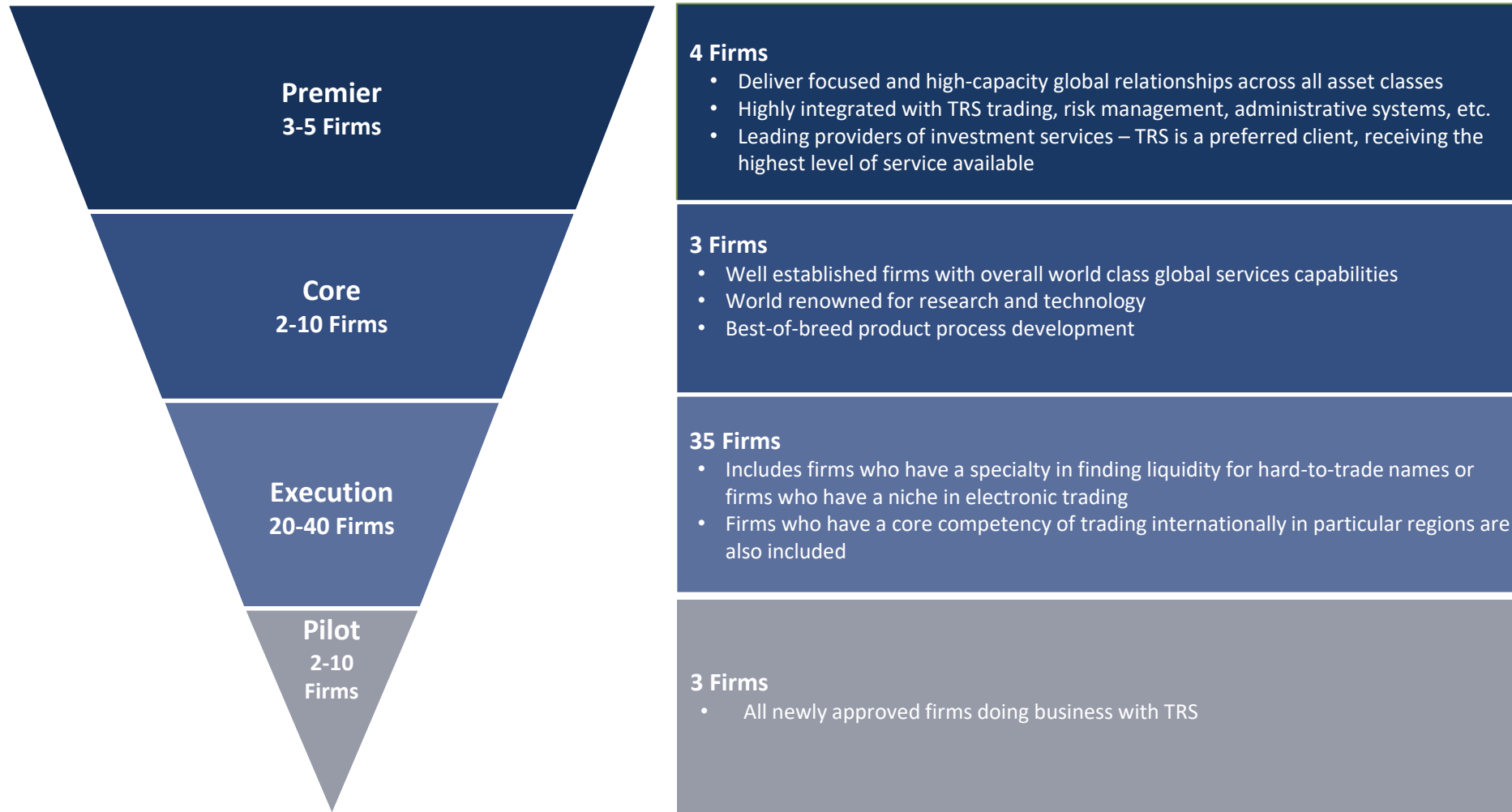
## Cross-Divisional Collaboration



For year ended September 30, 2022  
Source: TRS IMD

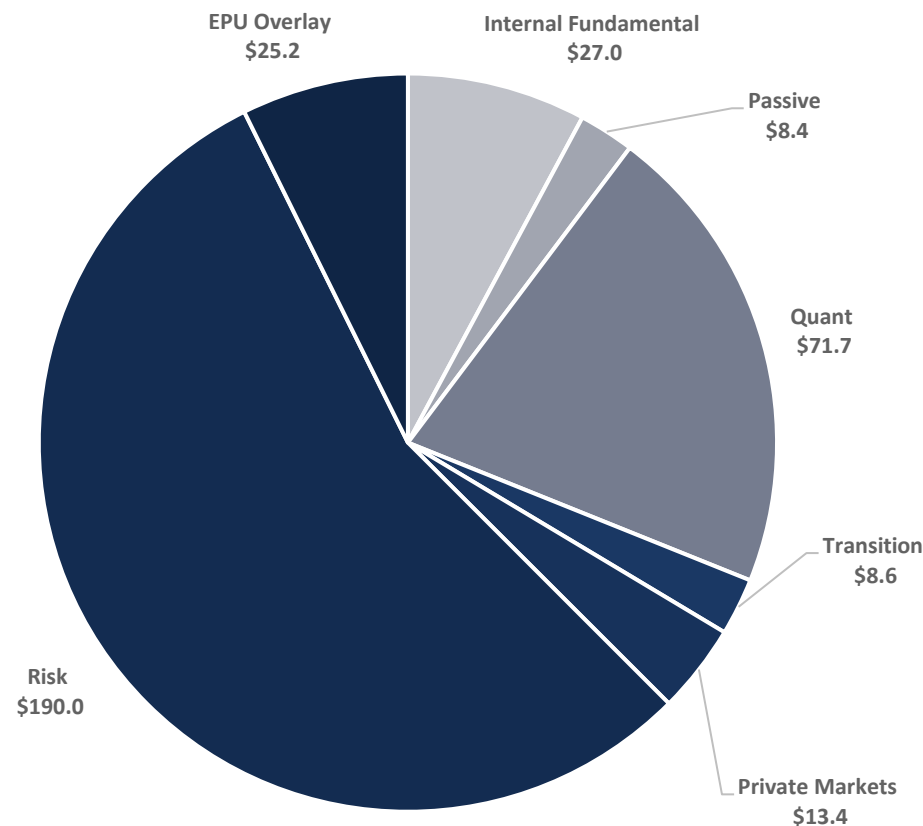
# Trading Partner Network

As of September 30, 2022

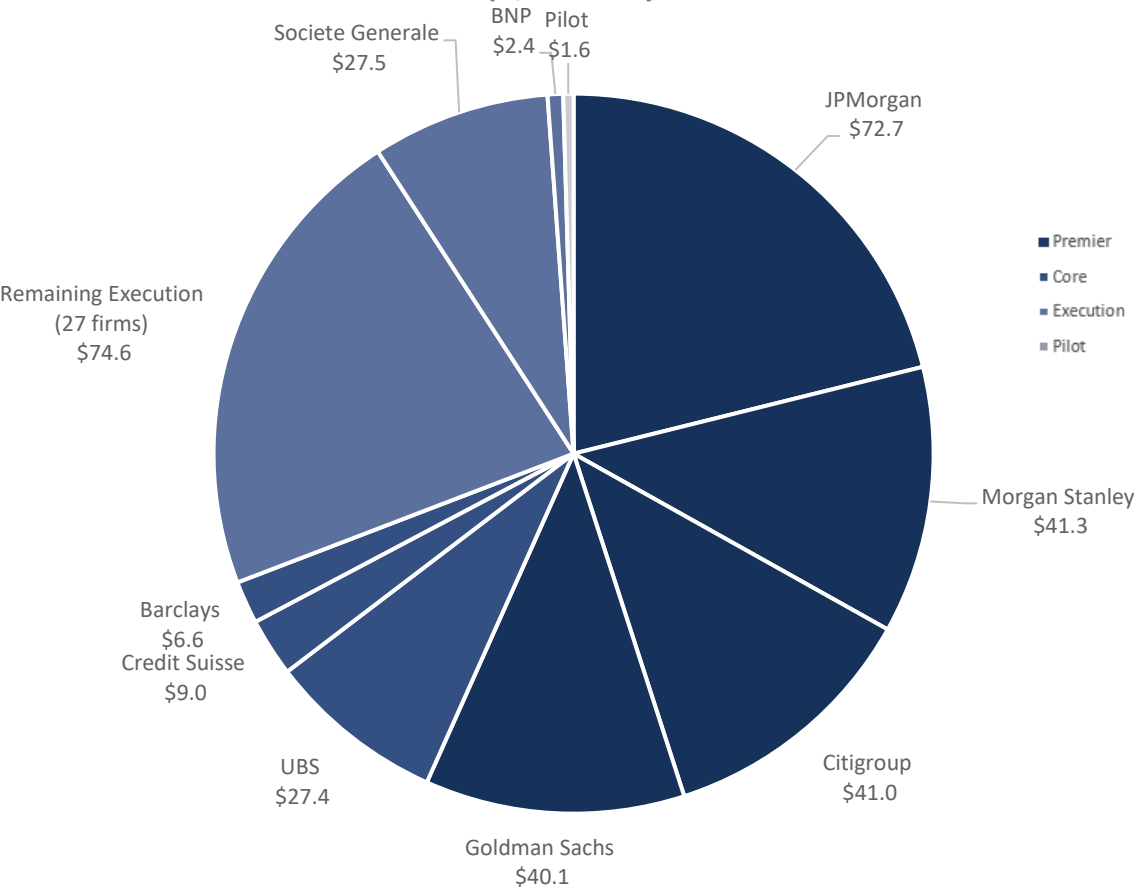


# Annual Trading Activity

Total Notional Traded By Strategy (\$, billions)



Total Notional Trade by Broker (\$, billions)



For year ended September 30, 2022  
Source: TRS IMD



# Equity Trading Performance

| TRS Trading Performance          |      |                           |                         |
|----------------------------------|------|---------------------------|-------------------------|
|                                  |      | <i>vs. Peer Benchmark</i> | <i>Quartile Ranking</i> |
| Year Ended Sept 30 <sup>th</sup> | 2022 | + 7                       | 2 <sup>nd</sup>         |
|                                  | 2021 | + 8                       | 1 <sup>st</sup>         |
|                                  | 2020 | + 10                      | 1 <sup>st</sup>         |
|                                  | 2019 | + 6                       | 1 <sup>st</sup>         |
|                                  | 2018 | + 6                       | 2 <sup>nd</sup>         |
|                                  | 2017 | + 3                       | 2 <sup>nd</sup>         |
|                                  | 2016 | + 6                       | 2 <sup>nd</sup>         |
|                                  | 2015 | + 8                       | 1 <sup>st</sup>         |
|                                  | 2014 | 0                         | 2 <sup>nd</sup>         |
|                                  | 2013 | + 11                      | 1 <sup>st</sup>         |
|                                  | 2012 | + 10                      | 1 <sup>st</sup>         |
|                                  | 2011 | + 2                       | 2 <sup>nd</sup>         |
|                                  | 2010 | + 27                      | 1 <sup>st</sup>         |
|                                  | 2009 | + 15                      | 1 <sup>st</sup>         |
| Target                           |      | + 8 bp                    | 1 <sup>st</sup>         |

- TRS has performed in-line with the median peer desk or better for 14 straight years
- Relative to our median peer we outperformed by \$56.8 million over the last year and over the last 13 years Trading retained \$583 million of TRS alpha over this time
- TRS equity execution is measured against the Virtu peer universe of institutional investors. The median performance of our peer universe is our benchmark

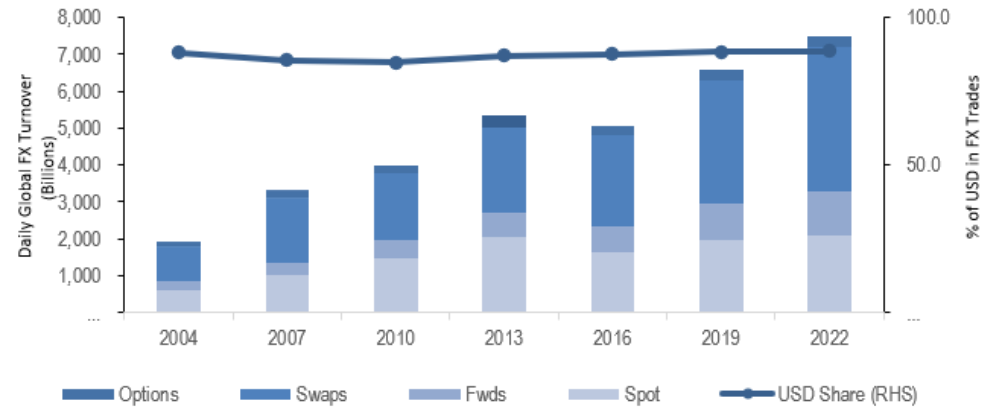
# Equity Passive Performance

| Passive Equity Performance |             |                  |                  |
|----------------------------|-------------|------------------|------------------|
| Style                      | AUM (\$Mil) | 1 Yr Alpha, (bp) | 3 Yr Alpha, (bp) |
| Passive USA                | \$5,005.6   | 5                | 46               |
| Passive EAFE+CA            | \$2,300.3   | 40               | N/A              |
| Passive EM                 | \$633.4     | N/A              | N/A              |
| Pristine USA               | \$109.4     | 3                | 2                |
| Pristine EAFE+CA           | \$128.8     | 49               | 43               |
| Pristine EM                | \$47.3      | 27               | 43               |

- Trading manages \$8.2 billion in Passive equities
- Passive Portfolios have close to zero tracking error and performance should mirror the underlying equity index
- Annual savings of passive portfolio vs holding ETFs is \$23.6 million

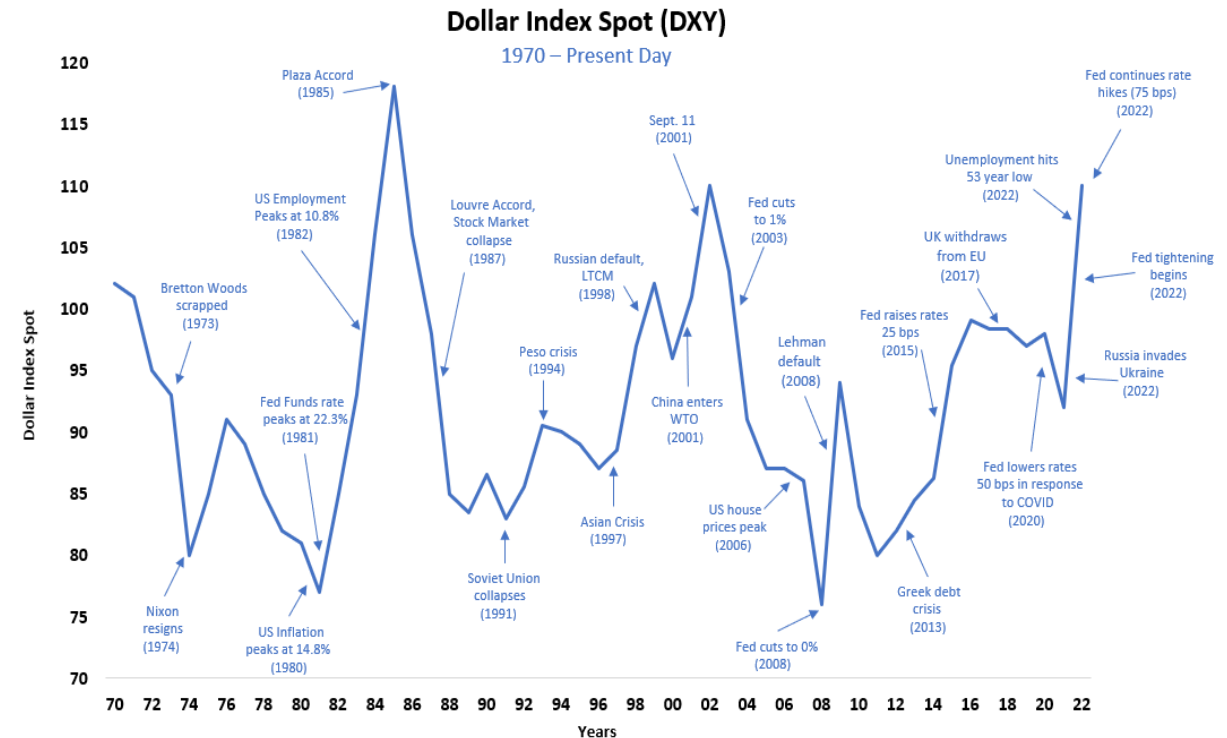
# Special Topic: Foreign Exchange (FX) Markets

## Market Structure



- Liquidity: \$6 trillion average daily traded volume
  - Most liquid market in the world
- 24 Hour Trading
- OTC Market: No centralized exchange
- Market Participants
  - Central Banks, Corporates, Asset Owners and Hedge Funds.

## US Dollar Strength



# Accomplishments and Priorities

## 2022 Accomplishments

- Effectively trained and integrated our new trader and trading analyst into the Trading Group
- Reviewed and updated our current procedures for all trading processes
- Continue to outperform our peer trading benchmark
- Effectively managed transitions between external managers and internal portfolios

## 2023 Priorities

- Automate our current Commission Management System and quarterly broker report card
- Optimize FX execution costs through use of liquidity pools trading with only our peers
- Improve the quality of our execution by enhancing how we review Transaction Cost Analysis (TCA)
- Improve execution quality across all asset classes by increasing algorithmic trading

# APPENDIX

# Broker Certification Process

## Phase 1 - Certification Process for New Firms

### Procedures for New Firms

- Broker qualifications questionnaire
- Minimum standard requirements

### Evaluation Period

- 6 to 18 month process
- Identify valued services
- Transaction cost analysis review
- Recommendations
- Category fit

### Annual Review

- Adds/Deletions
- Promotions/Demotions
- Qualitative review
- On-Site visit

### Certification Process

- Senior management review

*If acceptable, then ...*

## Phase 2 - Broker added to Pilot Program

### Pilot Program

- Pilot brokers evaluated quarterly using same criteria as all TRS brokers

### Quarterly Review Process

- Trader vote
- Transaction cost analysis
- Quarterly report card to each broker

### Two Year Process

- Pilot brokers typically have up to a 2 year evaluation process to qualify for advancement to execution category

### Completion of Pilot Program

- Advance to execution /core category or remove from broker list
- Broker has opportunity to advance based on performance after 1 year

---

---

This slide was intentionally left blank.

---

---

This slide was intentionally left blank.



Annual Update to the Board

# Risk and Portfolio Management

James Nield, Chief Risk Officer

Mark Telschow, Director, RPM Portfolios

**December 2022**



# Risk and Portfolio Management (RPM)

*Enable efficient risk usage and enhance returns*

---



## RISK AND PORTFOLIO MANAGEMENT

- RISK MANAGEMENT
- RPM PORTFOLIOS
- TRUST MANAGEMENT
- TRUST STRATEGY

# Risk and Portfolio Management Group



**James Nield, CFA, FRM**  
**Chief Risk Officer**  
*MBA, Finance,  
 New York University  
 BS, Finance,  
 Pennsylvania State University*



**Mark Telschow, CFA**  
**Director**  
*BS, Civil Engineering,  
 University of Texas*



**Stephen Kim**  
**Director**  
*MBA, Finance,  
 University of Texas,  
 BS, Computer Science,  
 Dartmouth College*



**Mike Simmons, CFA**  
**Director**  
*MPA, Accounting,  
 University of Texas  
 BBA, Finance,  
 Texas A&M University*



**Hasim Mardin, FRM**  
**Investment Manager**  
*MS, Economics,  
 University of Texas*



**Teresa Lwin, PhD.**  
**Investment Manager**  
*PhD, Finance,  
 MBA, Chicago Booth  
 School of Business*



**Melissa Jerkins, PhD**  
**Investment Manager**  
*PhD, Physics,  
 University of Texas  
 BS, Abilene Christian University*



**Steven Lambert**  
**Senior Associate**  
*MBA, Finance,  
 Northeastern University  
 BS, Business Management,  
 Saint Joseph's College*



**Chris Pan**  
**Senior Associate**  
*MPA, University of Texas  
 BBA, Accounting,  
 University of Texas*



**Andrew Arts**  
**Senior Associate**  
*BA, Economics,  
 University of Wisconsin-Madison*



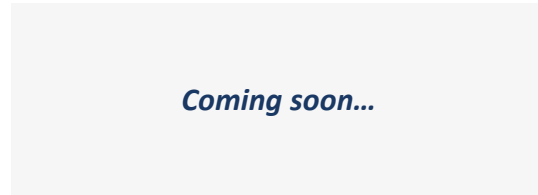
**Paul Wacławsky, CFA**  
**Senior Analyst**  
*BS, Accounting,  
 University of Maryland*



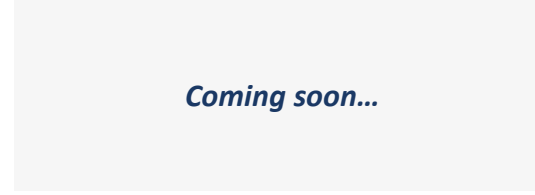
**Emalee Jimenez**  
**Senior Analyst**  
*MS, Applied & Computational  
 Mathematics, Johns Hopkins University  
 BS, Mathematical Finance,  
 Hofstra University*



**Emily Lu**  
**Senior Analyst**  
*BS, Statistics & Data Science,  
 UC Santa Barbara*



*Coming soon...*



*Coming soon...*



**Melissa Juranek**  
**Assistant**  
*BBA, Management,  
 University of Texas*

**11**

Years of average direct  
 investment experience

**16**

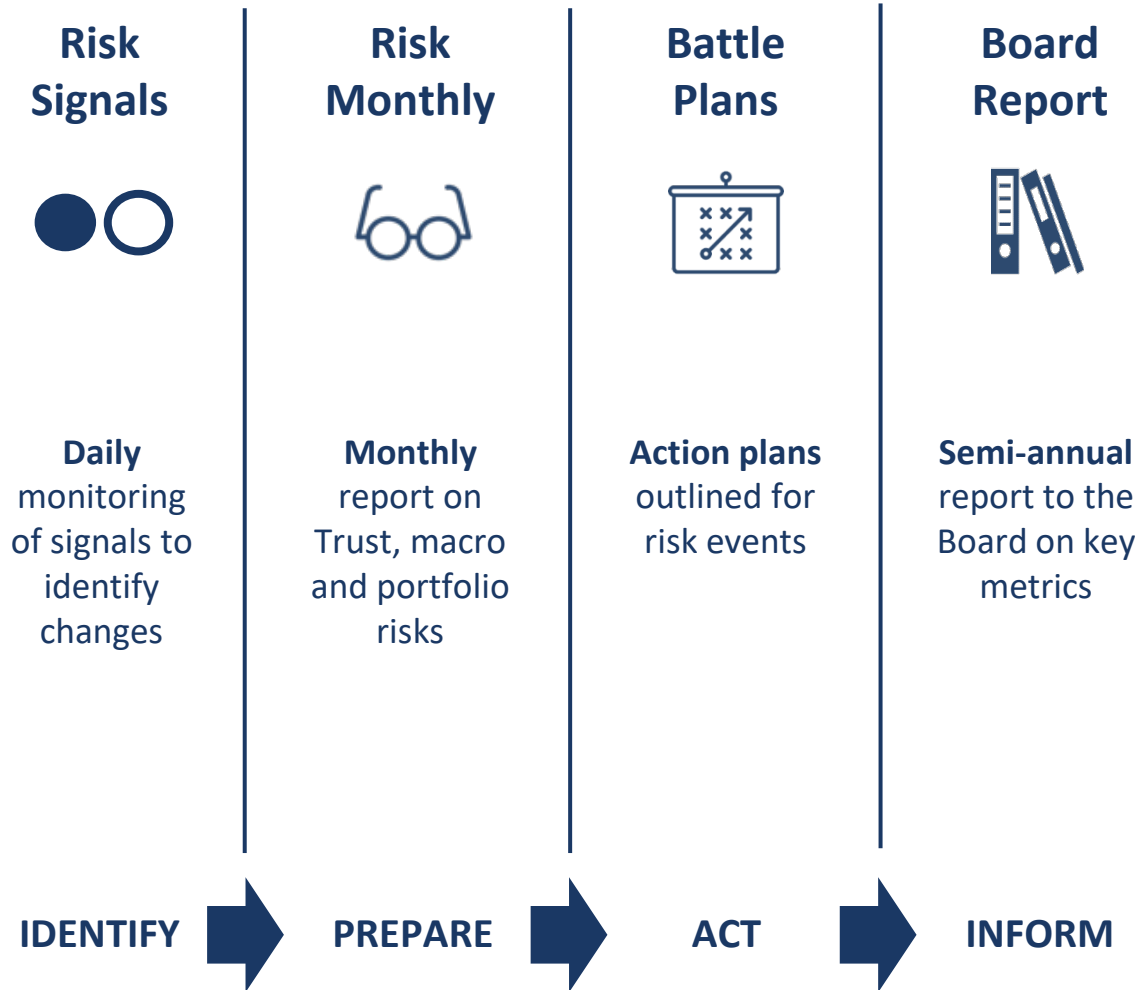
Advanced degrees  
 and certifications

**2**

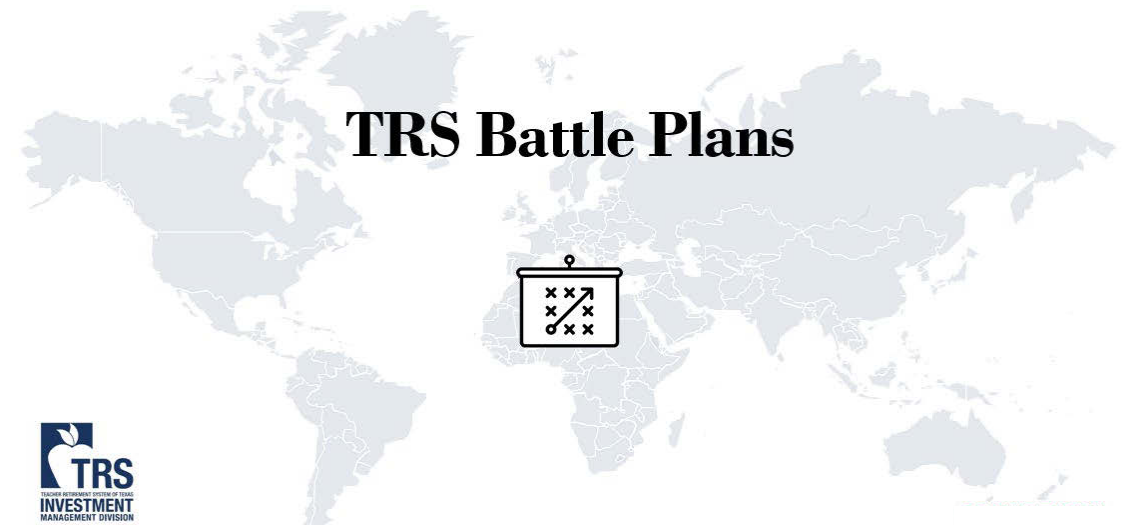
Positions to be  
 filled

# Risk Management

# Risk Management process overview



- Twenty-eight **Battle Plans** in place
- Recent plans enacted include:
  - Bubble signals
  - Allocation limits
  - Counterparty risk



# Data modernization enhancing Risk Management

- RPM Group: Key contributor to and beneficiary of IMD data modernization efforts
- Data visualization software enables “drill-through” analysis to enable more useful reporting:
  - Trust Balance Sheet exposure
  - Daily derivative Value at Risk (VaR)
  - Risk Signals
    - Daily email generated to direct reader as to which items merit attention

## Sample Risk Signal daily email

| Total | Tier 1 | Tier 2 | Tier 3 |
|-------|--------|--------|--------|
| 5     | 2      | 1      | 2      |

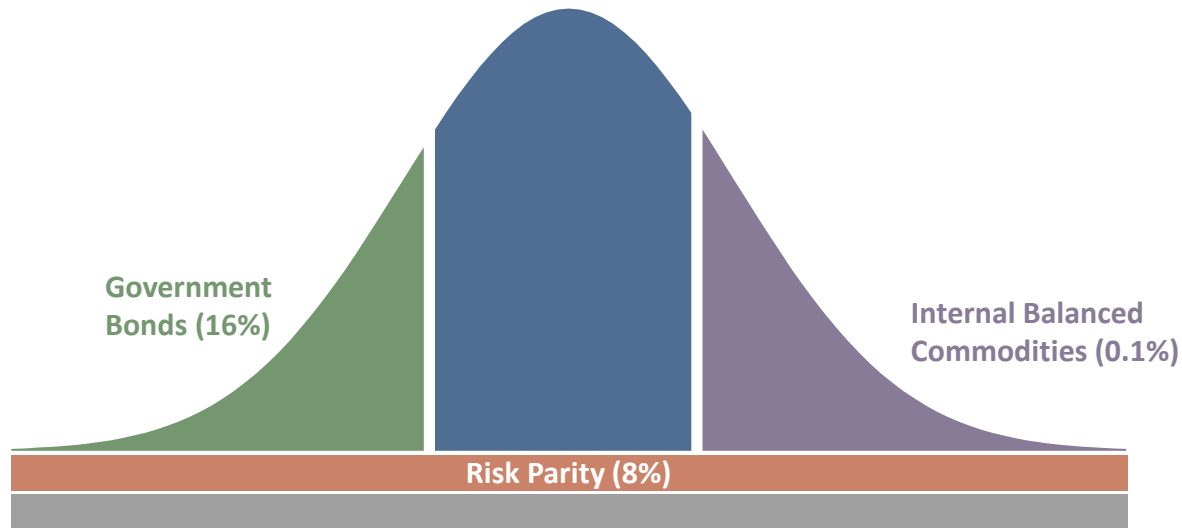
### Top 10 Risk Signals

| Signal Name                           | Category     |
|---------------------------------------|--------------|
| <b>Tier 1 -- Battleplan Signals</b>   |              |
| AA Private Equity                     | Allocation   |
| Counterparty Rating Change            | Counterparty |
| <b>Tier 2 -- Asset Class Signals</b>  |              |
| Bloomberg Commodities 1wk z-score     | Commodities  |
| <b>Tier 3 -- Single Asset Signals</b> |              |
| Natural Gas 1wk z-score               | Commodities  |
| U.K. Bonds (10 Yr.) 1wk z-score       | FI           |



# RPM Portfolios

# Positive 1-Year alpha for RPM Portfolios

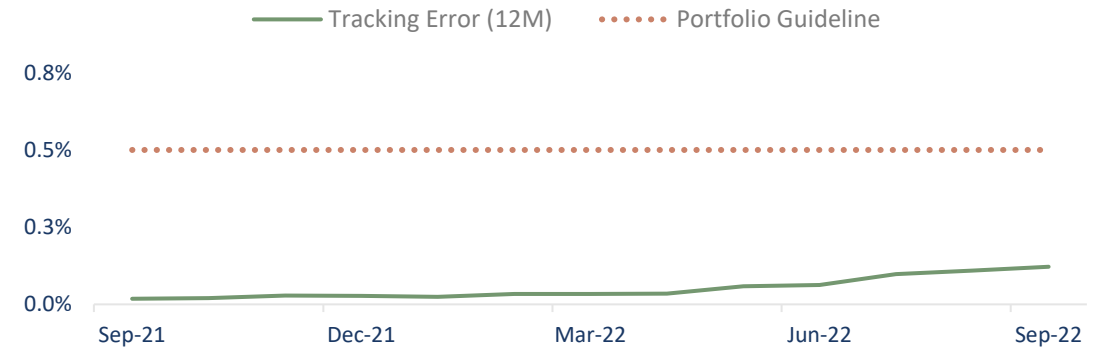


- **Government Bonds** (\$21.4b): Passively managed
- **Risk Parity** (\$11.2b): Balanced risk exposure implemented both internally and via external managers
- **Internal Balanced Commodities** (\$0.1b): Diversified commodities exposure; launched September 2022

## Portfolio Returns

|                         | 1-Year |        | 3-Year |        |
|-------------------------|--------|--------|--------|--------|
|                         | Return | Excess | Return | Excess |
| <b>Government Bonds</b> | -26.9% | -0.2%  | -8.6%  | -0.1%  |
| <b>Risk Parity</b>      | -23.6% | 2.5%   | -4.4%  | -1.2%  |

## Government Bonds Tracking Error

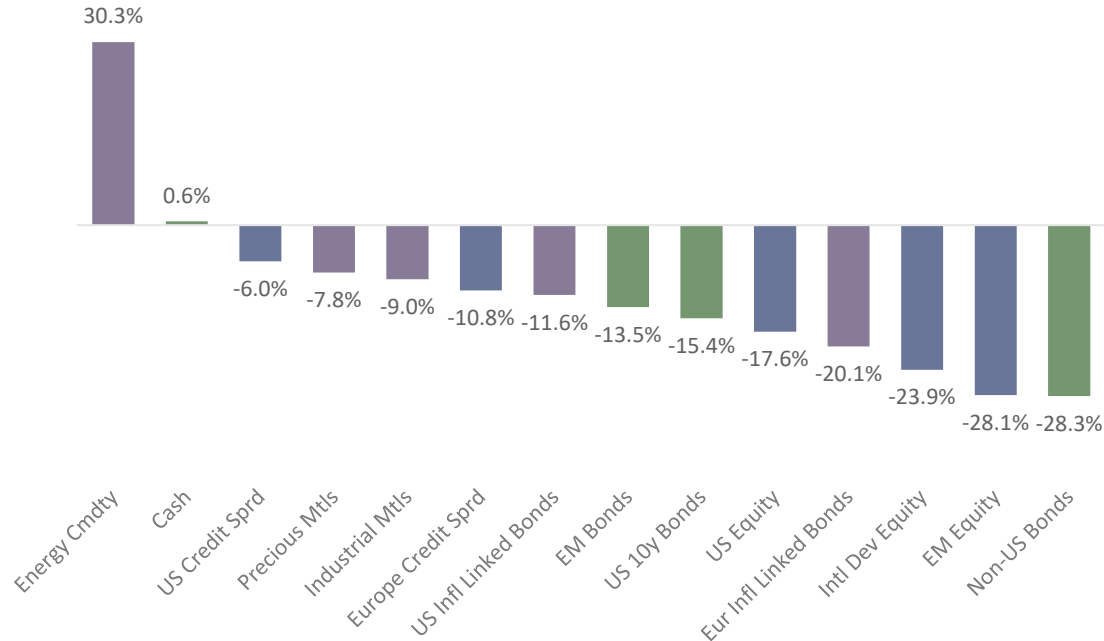




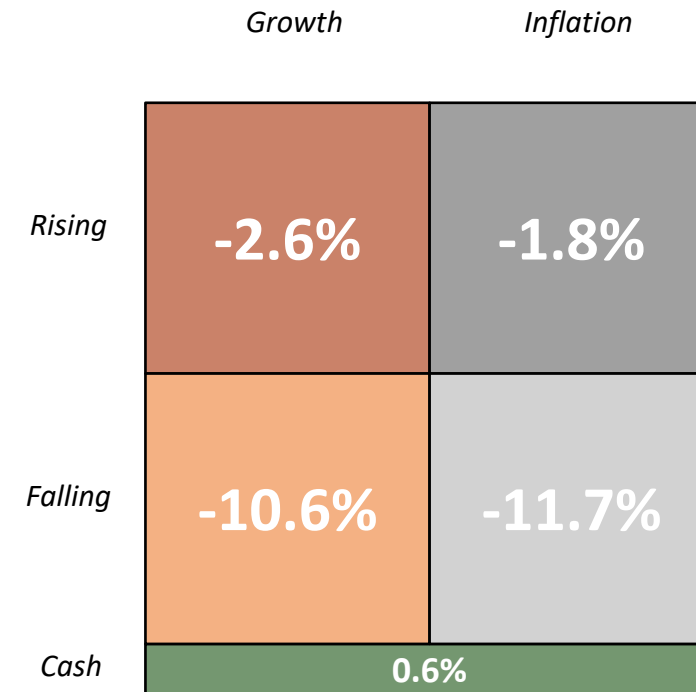
# Difficult market as cash has outperformed most assets

- Assets have underperformed cash over the past year with few exceptions

## 1-Year Returns

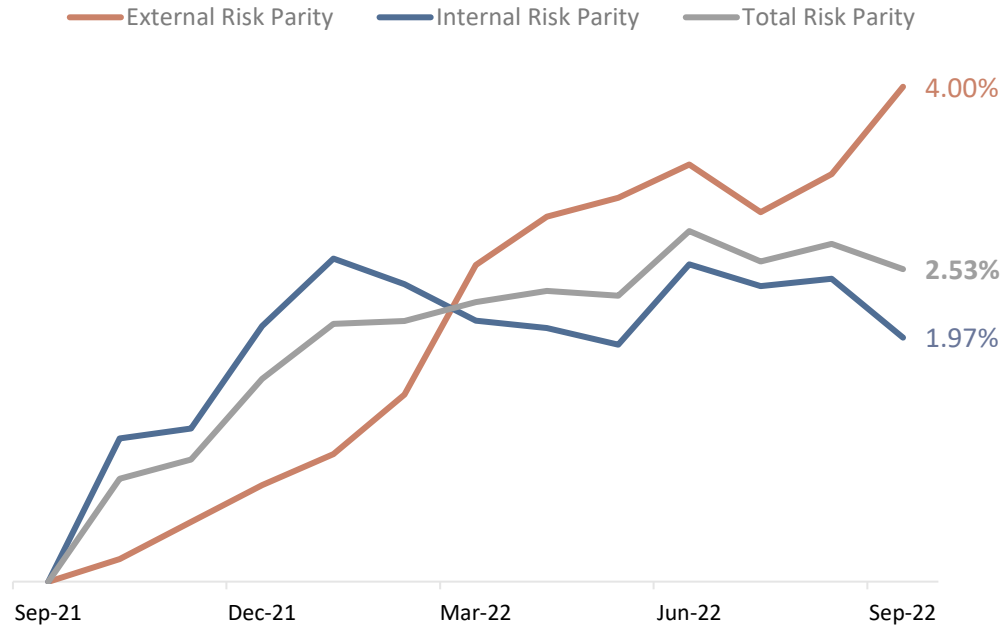


- ... Leading to negative return contributions from all four Risk Parity environmental boxes



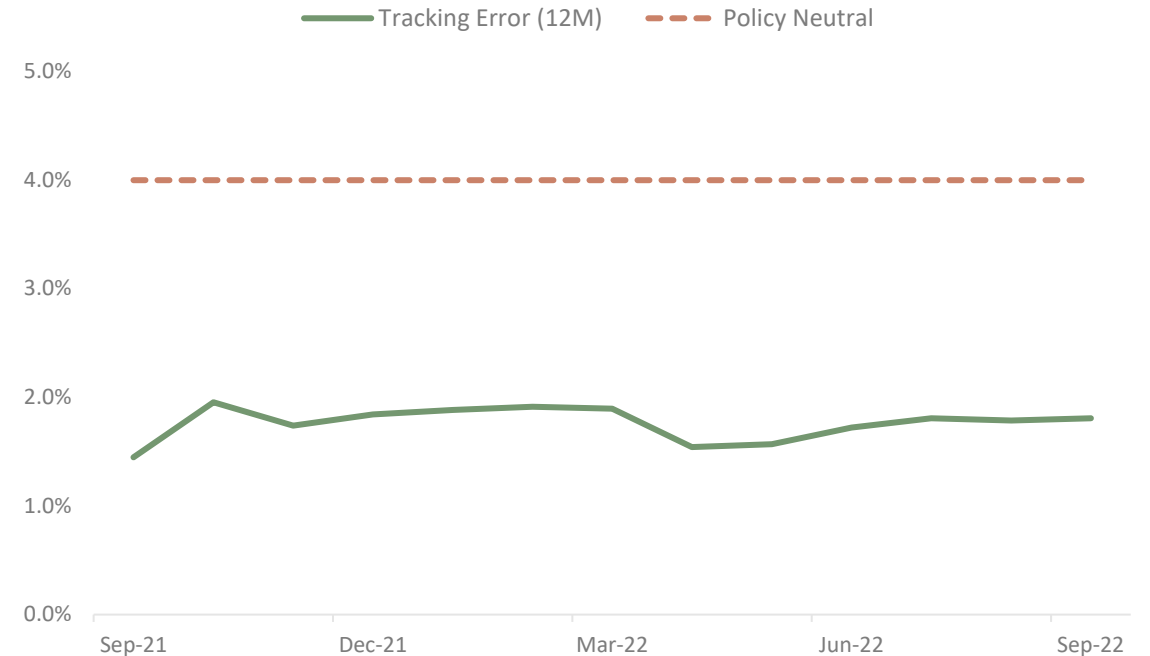
# Positive **Risk Parity** alpha combined with low tracking error

**Risk Parity Cumulative Alpha**  
*Trailing 12 Months*



- Manager selection led to +400 bp of outperformance for **External Risk Parity**
- Asset Mix led to +197 bp of alpha for **Internal Risk Parity**

**Internal RP Tracking Error**

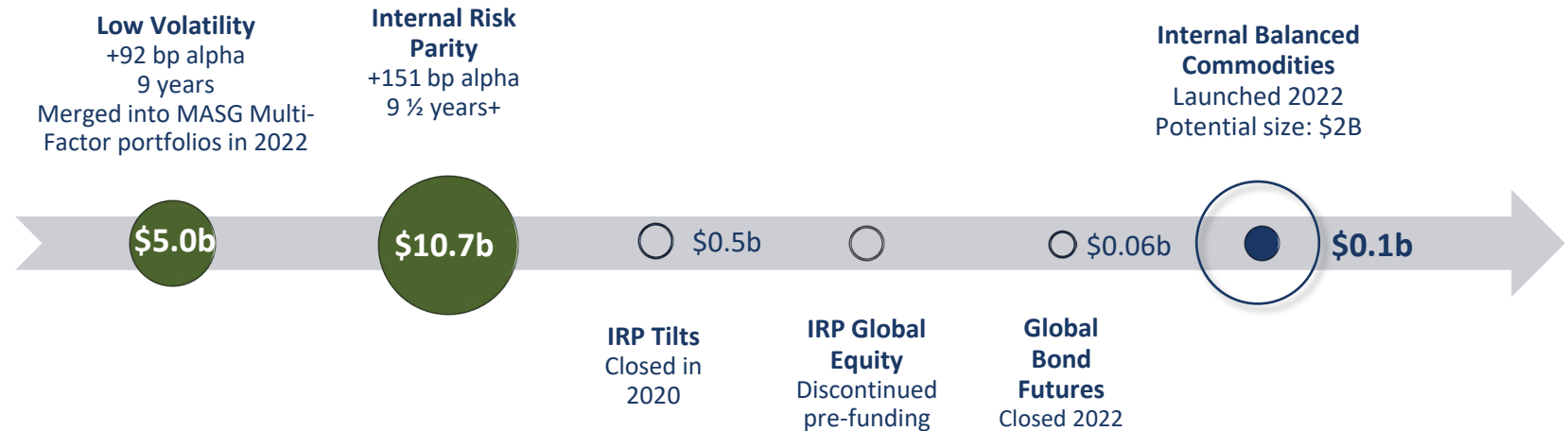


- Risk Parity tracking error is actively managed to reduce the range of relative outcomes through both risk level and asset mix

# Research Portfolios facilitate knowledge share and innovation

- Research portfolio process continues to serve Trust and RPM well
- Portfolios expand internal capabilities, reduce fees and provide flexibility
- RPM has launched six research initiatives since 2012
- Internal Balanced Commodities is most recent research portfolio
  - Provides balanced commodity allocation similar as approach taken in Internal Risk Parity
  - Provides Trust with additional tool to balance exposure to rising inflation

## RPM Portfolio Research Initiatives



# Trust Management

# Trust Management Process Overview

## Finance Liquidity



- Set liquidity targets
- Conduct repo activity
- Manage derivative trading

## Rebalance Exposure



- Analyze risks
- Minimize costs
- Direct trades within TRS

## Optimize Balance Sheet



- Manage collateral
- Lend securities
- Implement overlay programs

## Liquidity Enhancements:

1. Developed **intraday** margin call estimates
2. Created daily Value at Risk (VaR) **data visualization** tool
3. Launched internal **Treasury-Bill** account to diversify cash holdings
4. Updated requirements for sizing **Securities Lending** program
5. Received '**AAA**' rating from S&P to facilitate financing activities

# Trust Strategy

# Trust Strategy Process Overview

## Research Environment



- Develop capital market assumptions
- Publish Market Intelligence
- Create Peer Intelligence report

## Strategize Improvements



- Coordinate Strategic Asset Allocation (SAA)
- Conduct benchmark review
- Execute hedges (currency)

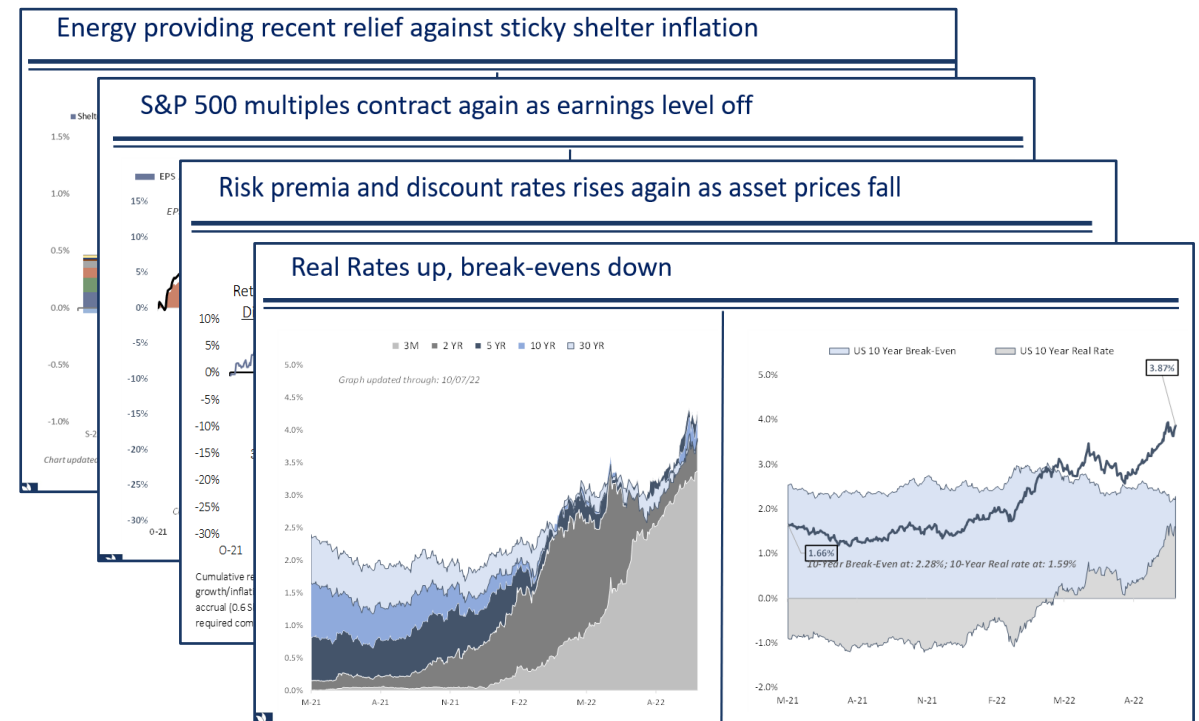
## Inform Decision making



- Support Asset Allocation Committee
- Provide Investment Policy updates

## Market Intelligence

- Monthly pack of key slides to better understand market developments and conditions



# Trust Strategy supports ongoing Strategic Asset Allocation (SAA) work

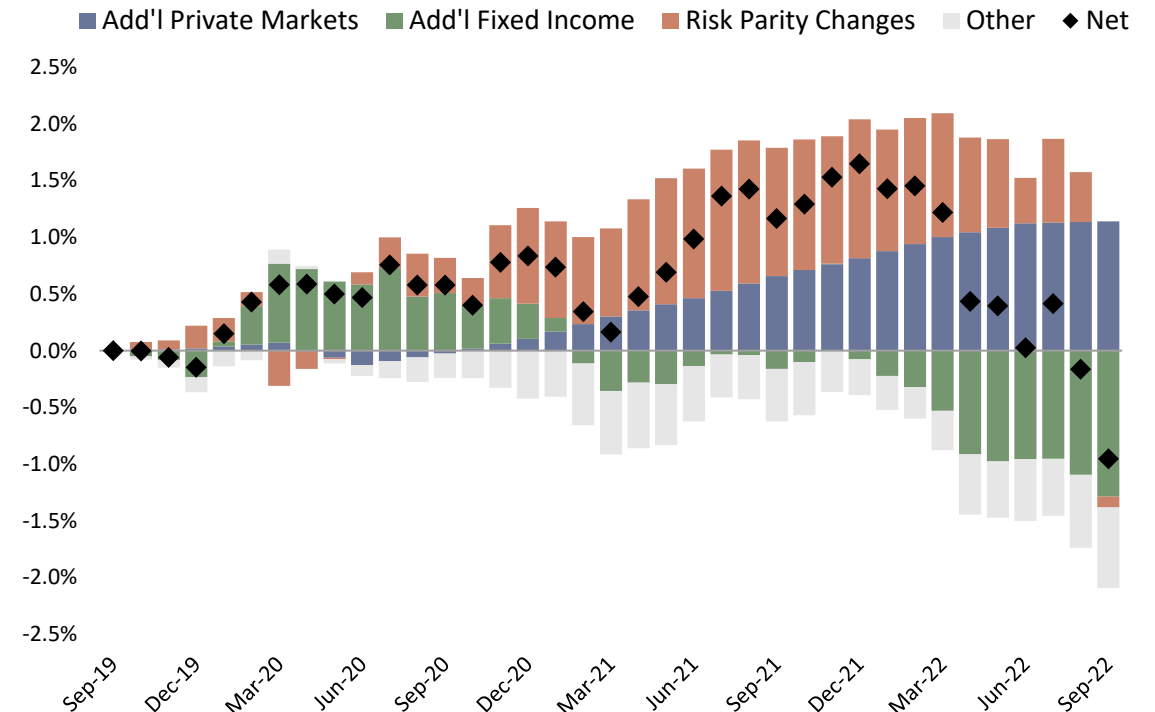
- Current SAA now lags prior SAA after three years:

|             | <u>Year 3</u> | <u>Cumul.</u> |
|-------------|---------------|---------------|
| Current SAA | -10.68%       | 15.75%        |
| Prior SAA   | -9.09%        | 16.75%        |
| Difference  | -1.59%        | -1.00%        |

- Leverage has added **0.63%** to returns:

|                   |         |               |
|-------------------|---------|---------------|
| SAA unlevered     | -10.11% | 15.15%        |
| + 4% net leverage | -0.50%  | <b>0.78%</b>  |
| - financing cost  | -0.07%  | <b>-0.15%</b> |
| SAA               | -10.68% | 15.75%        |

- Recent asset declines have negatively impacted SAA performance





# In conclusion...

---

1. **Risk Management** using data modernization to enhance analysis
2. **RPM Portfolios** generated Risk Parity alpha and achieved Government Bond objectives
3. **Trust Management** expanded liquidity management tools
4. **Trust Strategy** preparing for SAA study

