Portfolio Structure Review
San Diego City Employees’ Retirement System
May 12, 2022
This page left blank intentionally
Discussion Guide

Section 1  Executive Summary

Section 2  Public Market Asset Class Review
  - U.S. Equity
  - Non-U.S. Equity
  - Global Equity
  - U.S. Fixed Income
  - Return-Seeking Fixed Income

Section 3  Alternative Asset Class Review
  - Real Estate
  - Private Equity and Infrastructure
  - Opportunity Fund

Section 4  Conclusions and Next Steps

Section 5  Appendix
This page left blank intentionally
Agenda Tracker

Section 1  Executive Summary

Section 2  Public Market Asset Class Review
- U.S. Equity
- Non-U.S. Equity
- Global Equity
- U.S. Fixed Income
- Return-Seeking Fixed Income

Section 3  Alternative Asset Class Review
- Real Estate
- Private Equity and Infrastructure
- Opportunity Fund

Section 4  Conclusions and Next Steps

Section 5  Appendix
Introduction

- **Portfolio structure** refers to the implementation of the long-term strategic asset allocation and is critical to the success of the investment program.

- Similar to the asset allocation, once thoughtfully set, portfolio structure is not intended to change materially or frequently.

- Aon conducts a structure review on an annual basis to ensure SDCERS’ strategic asset allocation is being implemented in a manner that is consistent with its long-term objectives and to identify any areas for improvement.

- SDCERS’ portfolio structure remains appropriate and continues to be managed in an efficient, risk-controlled and cost-conscious manner.
The below table highlights the hierarchy of investment risks and the tools and procedures in place to address these risks.

<table>
<thead>
<tr>
<th>Risk Management Tool</th>
<th>Risks Addressed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Asset Liability Study</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
  • Stochastic and Deterministic scenario analysis  
  • Efficient Frontier Analysis  
  • Stress Tests  
  • Liquidity Analysis/Stress Test  |  • Ability to pay promised benefits  
  • Assets (return + contributions) do not grow with liabilities  
  • Liquidity |  • Expected to reach full funding within 20 years  
  • 78/22 appropriate risk posture given time horizon and return needs  
  • Ability to invest in illiquid assets with no concerns regarding paying benefits  |
| **2. Asset Allocation Study**  |
  • Mean Variance analysis  
  • Historical scenario analysis  
  • Forward looking (stochastic) scenario analysis  
  • Deterministic Scenario Analysis  
  • Factor Analysis  |  • Return shortfall  
  • Diversification / Concentration Risk  
  • Left tail risk |  • Long-term return expected to exceed actuarial assumed return  
  • Well-diversified portfolio with balanced risk exposures  
  • Recognize explicit ‘protection’ role of risk-reducing allocation  
  • Appropriate inflation hedge  
  • Flexibility in implementation  |
| **3. Structure Review**  |
  • Market coverage  
  • Equity exposure  
  • Active / Passive  
  • Active Risk Contribution  
  • Interest Rate Exposure  
  • Credit Exposure  
  • Active Manager Review |  • Unintended biases  
  • Concentration Risk (active risk, geographic, style, size, etc.)  
  • Active management  
  • Cost structure |  • Broad, well-diversified exposure across markets  
  • Deliberate active risk taking  
  • Efficient use of low cost options  
  • Appropriate monitoring and reporting policies  
  • Focus on high conviction active managers |
SDCERS: Portfolio Structure Review Conclusions

- SDCERS’ portfolio structure has been well-crafted with a deliberate allocation of active risk
- Meaningful allocation to alternatives, where probability of enhanced alpha is greater
- Increased efficiency within public markets
  - Global market exposure across public equities
  - Low-cost passive management in highly efficient markets
  - Focused active management in areas with greatest probability of success
- Constant exploration and consideration for attractive and new or opportunistic investments for potential fit within the Opportunity Fund
- Current portfolio structure appropriate given SDCERS’ goals
- No recommendations as a result of the 2022 structure review
  - Aon continues to work with SDCERS Investment Team on the manager construct of the return-seeking fixed income allocation
  - Aon believes the high-quality, core make-up of the risk-reducing fixed income allocation continues to be appropriate
Agenda Tracker

Section 1 Executive Summary

Section 2 Public Market Asset Class Review
- U.S. Equity
- Non-U.S. Equity
- Global Equity
- U.S. Fixed Income
- Return-Seeking Fixed Income

Section 3 Alternative Asset Class Review
- Real Estate
- Private Equity and Infrastructure
- Opportunity Fund

Section 4 Conclusions and Next Steps

Section 5 Appendix
**SDCERS: Active vs. Passive Key Takeaways**

- **Risk Controlled**: Deliberate and diversified active risk
- **Efficient**: Purposeful and managed deployment of investment management fees
- **Successful**: Value-add across asset classes, particularly within alternatives

<table>
<thead>
<tr>
<th>Since Inception Ending 12/31/21</th>
<th>SDCERS' Return</th>
<th>Excess Return</th>
<th>Active Risk</th>
<th>Information Ratio</th>
<th>Active / Passive Mix (%)</th>
<th>Fees*</th>
<th>Inception Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Equity</td>
<td>11.4%</td>
<td>0.1%</td>
<td>0.4%</td>
<td>0.06</td>
<td>93 / 7</td>
<td>0.07%</td>
<td>1/1989</td>
</tr>
<tr>
<td>Non-U.S. Equity</td>
<td>7.6</td>
<td>1.5</td>
<td>0.8</td>
<td>0.21</td>
<td>39 / 61</td>
<td>0.28</td>
<td>4/1995</td>
</tr>
<tr>
<td>Global Equity</td>
<td>11.9</td>
<td>-0.4</td>
<td>2.6</td>
<td>0.07</td>
<td>100 / 0</td>
<td>0.56</td>
<td>6/2012</td>
</tr>
<tr>
<td>U.S. Fixed Income</td>
<td>6.1</td>
<td>0.9</td>
<td>0.4</td>
<td>0.32</td>
<td>70 / 30</td>
<td>0.15</td>
<td>4/1989</td>
</tr>
<tr>
<td>Return-Seeking FI</td>
<td>2.6</td>
<td>0.3</td>
<td>1.4</td>
<td>0.24</td>
<td>100 / 0</td>
<td>0.61</td>
<td>7/2011</td>
</tr>
<tr>
<td>Real Estate**</td>
<td>8.9</td>
<td>0.7</td>
<td>n/a</td>
<td>n/a</td>
<td>100 / 0</td>
<td>Flat: 0.3% - 1.5% Perf. Based: 0% and 30% to 2% and 20%</td>
<td>1/1989</td>
</tr>
<tr>
<td>Private Equity**</td>
<td>20.0</td>
<td>4.4</td>
<td>n/a</td>
<td>n/a</td>
<td>100 / 0</td>
<td>10/2011</td>
<td></td>
</tr>
<tr>
<td>Infrastructure**</td>
<td>8.4</td>
<td>-0.5</td>
<td>n/a</td>
<td>n/a</td>
<td>100 / 0</td>
<td>1/2015</td>
<td></td>
</tr>
<tr>
<td>Opportunity Fund</td>
<td>7.9</td>
<td>-0.5</td>
<td>n/a</td>
<td>n/a</td>
<td>100 / 0</td>
<td>6/2014</td>
<td></td>
</tr>
</tbody>
</table>

*Based on 12/31/21 market values; represent management fees only. Private market fees reflect typical industry fee ranges and **not** fees specific to SDCERS' portfolio.

**Reflects Performance as of 9/30/21. Prior to 3Q 2014, only the returns for the private portion of the real estate portfolio and its benchmark are reported on a quarter lagged basis.
SDCERS: U.S. Equity Portfolio Snapshot

- **Role:** Growth
- **Long-Term Target:** 17%*
- **Observations:**
  - Style & size neutral
  - Majority is passively managed
- **Recommendation**
  - Maintain current structure

**Portfolio Snapshot (As of 12/31/2021)**

<table>
<thead>
<tr>
<th>Asset class benchmark</th>
<th>DJ U.S. Total Stock Market Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Interim Target and Allocation</td>
<td>18.6% / $2.2B</td>
</tr>
<tr>
<td>Active/Passive mix</td>
<td>7 / 93</td>
</tr>
<tr>
<td>Number of active managers</td>
<td>1</td>
</tr>
<tr>
<td>Annual investment management fees</td>
<td>7 bps (approx. $1.4 million)**</td>
</tr>
<tr>
<td>Projected tracking error (active risk)</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

*Asset Allocation Review recommends 19% allocation to align total public equity with global investable opportunity set
* Based on investment management fee schedules and asset values as of 12/31/2021.
U.S. Equity: Active Risk Decomposition

<table>
<thead>
<tr>
<th>Manager</th>
<th>Allocation (%)</th>
<th>Active Risk (%)</th>
<th>Contribution to Active Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR S&amp;P 500 Index Fund</td>
<td>32.3%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BR DJ US TSM Index</td>
<td>60.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>William Blair SMID Core</td>
<td>7.2</td>
<td>4.8%</td>
<td>69.5%</td>
</tr>
</tbody>
</table>

*Misfit Relative to Asset Class Benchmark ➔* 30.5%

Total U.S. Equity Active Risk ➔ 0.4% 100.0%

- Aon expects the U.S. equity portfolio as currently constructed to incur active risk of approximately 0.4%
  - This is by design as the U.S. equity market is very efficient and active risk is preferred to be taken elsewhere in the portfolio
SDCERS Non-U.S. Equity Portfolio Snapshot

- **Role**: Growth, Diversification
- **Long-Term Target**: 14%*
- **Observations**:
  - Size & style neutral
  - Neutral on region allocations
  - Heavy usage of passive management
  - 6 active managers managing 40% of portfolio
- **Recommendation**
  - Maintain current structure

### Portfolio Snapshot (As of 12/31/2021)

<table>
<thead>
<tr>
<th>Asset class benchmark</th>
<th>MSCI ACW ex-U.S. IMI Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current interim policy and dollar allocation</td>
<td>15.5%, $1.6 billion</td>
</tr>
<tr>
<td>Active/Passive mix</td>
<td>39 / 61</td>
</tr>
<tr>
<td>Number of active managers</td>
<td>6</td>
</tr>
<tr>
<td>Annual investment management fees</td>
<td>28 bps (approx. $4.6 million)**</td>
</tr>
<tr>
<td>Projected tracking error (active risk)</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

*Asset Allocation Review recommends 12% allocation to align total public equity with global investable opportunity set.
** Based on investment manager fee schedules and asset values as of 12/31/2021.

---

Roles:
- Growth, Diversification
- Long-Term Target: 14%
- Observations:
  - Size & style neutral
  - Neutral on region allocations
  - Heavy usage of passive management
  - 6 active managers managing 40% of portfolio
- Recommendation:
  - Maintain current structure

### Portfolio Composition (As of 12/31/2021)

- BlackRock MSCI ACWI ex-US, 61%
- Brandes International Value, 13%
- Artisan Non-US SMID Growth, 4%
- Aberdeen EM, 3%
- Neuberger Berman EM, 3%
- AQR International Small Cap EAFE, 3%
- William Blair International Leaders, 13%
### Non-U.S. Equity: Active Risk Decomposition

<table>
<thead>
<tr>
<th>Manager*</th>
<th>Allocation (%)</th>
<th>Active Risk (%)</th>
<th>Contribution to Active Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR MSCI ACWI ex-U.S. IMI Index</td>
<td>60.6%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brandes International Value</td>
<td>13.3</td>
<td>5.4%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Artisan Non-US SMID Growth</td>
<td>4.0</td>
<td>5.8</td>
<td>12.8</td>
</tr>
<tr>
<td>Aberdeen Emerging Markets</td>
<td>3.2</td>
<td>4.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Neuberger Berman Emerging Markets</td>
<td>3.1</td>
<td>8.3</td>
<td>6.7</td>
</tr>
<tr>
<td>AQR Int’l Small Cap</td>
<td>3.1</td>
<td>6.8</td>
<td>4.9</td>
</tr>
<tr>
<td>William Blair International Leaders</td>
<td>12.8</td>
<td>5.2</td>
<td>46.4</td>
</tr>
<tr>
<td><strong>Misfit Relative to Asset Class Benchmark</strong></td>
<td></td>
<td></td>
<td><strong>13.2%</strong></td>
</tr>
<tr>
<td><strong>Total Non-U.S. Equity Active Risk</strong></td>
<td><strong>0.8%</strong></td>
<td></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

- Aon expects the Non-U.S. equity portfolio as currently constructed to incur active risk of approximately 0.8%
  - The contribution to active risk is well-balanced across the managers

Active Risk analysis based on policy allocations and trailing 5-years of historical monthly returns.
SDCERS Global Equity Portfolio Snapshot

- **Role**: Growth, Diversification, Alpha
- **Long-Term Target**: 8%
- **Observations**:
  - Current underweight to U.S. market
  - Slight value and small cap bias
  - Style/size tilts may not persist given flexibility of active mandates to invest across styles
- **Recommendation**:
  - Maintain current structure

### Portfolio Snapshot (As of 12/31/2021)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asset class benchmark</strong></td>
<td>MSCI All Country World Index</td>
</tr>
<tr>
<td><strong>Current policy and dollar allocation</strong></td>
<td>8.0%, $978 million</td>
</tr>
<tr>
<td><strong>Active/Passive mix</strong></td>
<td>100% Active</td>
</tr>
<tr>
<td><strong>Number of active managers</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Annual investment management fees</strong></td>
<td>56 bps (approx. $5.5 million)*</td>
</tr>
<tr>
<td><strong>Projected tracking error (active risk)</strong></td>
<td>2.6%</td>
</tr>
</tbody>
</table>

*Based on investment manager fee schedules and asset values as of 12/31/2021.*
Global Equity Portfolio Skyline

**Portfolio Skyline**

- **Style Tilt**
  - Value
  - Growth
  - Quality
  - Momentum
  - Low Vol
  - Risk
  - ESG

**Relative Sector Distribution**
- Cons Disc
- Cons Staples
- Energy
- Financials
- Health Care
- Industrials
- Info Tech
- Materials
- Real Estate
- Telecom
- Utilities

**Relative Style Distribution**
- Large Value
- Mid Value
- Small Value
- Large Growth
- Mid Growth
- Small Growth

**Relative Regional Distribution**
- North America
- UK
- Europe ex UK
- Japan
- Pacific ex Japan
- Emerging Markets
- Other
- Cash

**Decomposition of Active Risk**
- Tracking Error = 2.5%

**Source:** Aon, Style Research. Portfolio Skyline Data as at 31 December 2021.
Distribution and TE Data as at 31 December 2021. Benchmark: MSCI ACWI

---

Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
### Global Equity: Active Risk Decomposition

<table>
<thead>
<tr>
<th>Manager</th>
<th>SDCERS Allocation (%)</th>
<th>Active Risk (%)</th>
<th>Contribution to Active Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMO Global Equity Allocation</td>
<td>28.1%</td>
<td>4.7%</td>
<td>34.8%</td>
</tr>
<tr>
<td>Walter Scott Global Equity</td>
<td>33.8</td>
<td>3.8</td>
<td>13.6</td>
</tr>
<tr>
<td>Dodge &amp; Cox Global</td>
<td>18.2</td>
<td>8.1</td>
<td>37.8</td>
</tr>
<tr>
<td>Arrowstreet Global</td>
<td>19.9</td>
<td>3.3</td>
<td>13.7</td>
</tr>
</tbody>
</table>

**Misfit Relative to Asset Class Benchmark** → 0.0%

**Total Global Equity Active Risk** → 2.6% 100.0%

- Aon expects the global equity portfolio as currently constructed to incur active risk of approximately 2.6%
- The contribution to active risk of the four active managers is well-balanced

Active Risk analysis based on policy allocations and trailing 5-years of historical monthly returns.
SDCERS’ Total Public Equity Portfolio

- SDCERS transitioned its total public equity portfolio to be in line with the global opportunity set
  - Comprised of U.S., non-U.S., and global equity asset classes
- Active management has the ability to take regional or country bets based on each strategy’s philosophy and outlook
- Rebalancing the equity portfolio to align with market weights will narrow the gap between actual regional exposures versus the benchmark weights

**SDCERS’ Policy is slightly underweight to U.S. Equity**

- Aon recommends rebalancing to align with current global equity investable opportunity set:

**SDCERS’ active managers (combined) are aligned with policy but underweight U.S. / overweight Non-U.S. on a global market weighted basis:**

*Source: MSCI Inc. - MSCI ACWI IMI as of December 31, 2021*
SDCERS U.S. Fixed Income Portfolio Snapshot

- **Role**: Downside Protection, Diversification, Liquidity
- **Long-Term Target**: 22%
- **Observations**:
  - Neutral credit quality and slight underweight duration relative to benchmark
  - Modest out-of-benchmark exposures
- **Recommendation**
  - Maintain current structure

### Portfolio Snapshot (As of 12/31/2021)

<table>
<thead>
<tr>
<th><strong>Asset class benchmark</strong></th>
<th>Barclays Intermediate Aggregate Bond Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current policy and dollar allocation</strong></td>
<td>22.4%, $2.1 billion</td>
</tr>
<tr>
<td><strong>Structural biases</strong></td>
<td>▪ Focus on core, high quality orientation to diversify equity risk</td>
</tr>
<tr>
<td><strong>Active/Passive mix</strong></td>
<td>70 / 30</td>
</tr>
<tr>
<td><strong>Number of active managers</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Annual investment management fees</strong></td>
<td>15 bps (approx. $3.2 million)*</td>
</tr>
<tr>
<td><strong>Projected tracking error (active risk)</strong></td>
<td>0.4%</td>
</tr>
</tbody>
</table>

* Based on investment manager fee schedules and asset values as of 12/31/2021.
## U.S. Fixed Income: Positioning Relative to Benchmark

<table>
<thead>
<tr>
<th>Credit Quality</th>
<th>SDCERS Total Fixed Income</th>
<th>Bloomberg Intermediate Aggregate Bond Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa/AAA</td>
<td>74.9%</td>
<td>78.5%</td>
</tr>
<tr>
<td>Aa/AA</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>A/A</td>
<td>8.9</td>
<td>8.8</td>
</tr>
<tr>
<td>Baa/BBB</td>
<td>11.4</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Total Investment Grade</strong></td>
<td><strong>97.6%</strong></td>
<td><strong>100.0%</strong></td>
</tr>
<tr>
<td>Ba/BB</td>
<td>2.4</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total Non-Investment Grade</strong></td>
<td><strong>2.4%</strong></td>
<td><strong>0.0%</strong></td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

| Effective Duration  | 3.9 Years                  | 4.4 Years                                   |
| Current Yield       | 1.77%                      | 2.19%                                       |

### Sector Exposure

- Government
- Credit
- Mortgage Backed
- Asset Backed
- High Yield Credit
- Non-U.S. Developed
- Emerging Market
- Cash & Equivalents
- Other

- Based on 12/31/2021 market values

---

Aon
Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
Role of Risk-Reducing Core Fixed Income

- SDCERS’ 22% target to core fixed income was reaffirmed during the 2021/22 asset liability study
- Over the past decade, several enhancements have been made to this portfolio:
  - Moved to higher quality orientation
  - Lowered duration to intermediate positioning to help shield impact of rising rates
    - YTD*, the US Int. Agg. has outperformed the US Full Duration Agg. by nearly 2 percentage points
  - Allocated more to active management & loosened manager guidelines to provide additional flexibility
- The average fixed income allocation for peer plans is 19%*
- The SDCERS fixed income allocation is benchmarked to the Bloomberg Barclays Intermediate Aggregate Bond Index

* Through 4/10/22
**TUCS Top Ten as of 9/30/21. Includes both US and Non-US Fixed Income
Role of Fixed Income: Reduce Portfolio Volatility / Equity Diversification

- On average, broad US intermediate fixed income has been uncorrelated with equity markets; over past 15-years*:
  - Aggregate index averaged a correlation of 0
  - Government bonds averaged a correlation of -0.2
- There have been periods of positive correlation, and we would expect similar bouts of that in the future
- Over the long-term, Aon assumes a global equity correlation of 0.1 with intermediate credit and -0.1 with intermediate gov’t bonds
- Aon’s forward-looking assumptions assume fixed income volatility of around 4% compared to 13% - 25% for return-seeking asset classes

*1-year correlation using monthly returns

Aon
Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
Role of Fixed Income: Downside Protection

- Core bonds have averaged +5.5% annualized over the past six market sell-offs, while global equities were down an average of -23.9%.
- Return patterns during stressed markets highlight lower volatility and attractive negative correlations from bonds during the periods when it is most needed.
- However, it is notable that the offset coming from bonds has decreased over the past 10-years as yields have come down - still in positive territory, but less so than historically.

![Core Bonds in Stressed Markets](chart)

Global Equity - MSCI ACWI IMI; REITs – NAREIT Equity; HY Bonds - Barclays US Corporate High Yield; Commodities - Bloomberg Barclays Commodity; Core Fixed Income – Blmb Barclays Aggregate Bond Index
Summary Conclusions

- While core bonds may be less attractive now for investors given low yields and rising interest rates, they still play a key role in the total portfolio context:
  - **Limit downside risk** – we expect bonds to hold up when they are needed most
  - **Reduce portfolio volatility** – historical 5-year standard deviation of intermediate fixed income was 2.25% vs. 14.84% for global equity through 12/31/21*
  - **Provide liquidity** – particularly important given net outflow status of the Plan
    - Paramount during periods of stress – i.e., for rebalancing purposes and to avoid selling distressed assets
      - Ex. in March 2020 Staff raised $150 million from core fixed income to fund future capital calls and benefit payments; the cash was overlaid to maintain market exposure, therefore limiting tracking error and avoiding the need to sell return-seeking assets that were more greatly impacted by the COVID drawdown
  - Core bonds are also readily accessible at a low cost
  - Eventually, higher interest rates should benefit the portfolio return through higher yields
  - **Alternatives** to core bonds exist, but come with important considerations:
    - Total Fund risk profile – moving away from core bonds will likely increase the overall risk of the portfolio, including volatility of returns and illiquidity risk
    - Liquidity profile – many alternatives to bonds come with additional illiquidity
    - Implementation challenges, including time to achieve exposure, suitable managers, costs, etc.
    - Proven effectiveness

*Global Equity- MSCI ACWI; Fixed Income – Blmb. Barclays Intermediate Aggregate Bond Index
### U.S. Fixed Income: Active Risk Decomposition

#### Current Portfolio

<table>
<thead>
<tr>
<th>Manager*</th>
<th>SDCERS Allocation (%)</th>
<th>Active Risk (%)</th>
<th>Contribution to Active Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR Intermediate Aggregate Index Fund</td>
<td>29.6%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TCW</td>
<td>35.2</td>
<td>0.7%</td>
<td>44.8%</td>
</tr>
<tr>
<td>PIMCO</td>
<td>35.3</td>
<td>0.8</td>
<td>55.2</td>
</tr>
<tr>
<td>Misfit Relative to Asset Class Benchmark</td>
<td></td>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td>Total Fixed Income Active Risk</td>
<td></td>
<td>0.4%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

- Aon expects the U.S. fixed income portfolio as currently constructed to incur active risk of approximately 0.4%
  - Contribution to active risk is evenly split between the 2 active managers

---

Active Risk analysis based on policy allocations and trailing 5-years of historical monthly returns.
SDCERS Return-Seeking Fixed Income Portfolio Snapshot

- **Role:** Yield, Diversification
- **Long-Term Target:** 5%
- **Observations:**
  - Current underweight to local currency due to out-of-benchmark exposure to corporates
  - Slight overweight to duration
- **Update**
  - In process of transitioning to broader Return-Seeking Fixed Income mandate; Staff and Aon are currently reviewing managers/strategies for consideration in this portfolio

### Portfolio Snapshot (As of 12/31/2021)

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset class benchmark</td>
<td>40% JP Morgan EMBI Global Diversified and 60% JP Morgan GBI-EM Global Diversified</td>
</tr>
<tr>
<td>Current interim policy target and dollar allocation</td>
<td>5.0%, $449 million</td>
</tr>
<tr>
<td>Active/Passive mix</td>
<td>100% Active</td>
</tr>
<tr>
<td>Number of active managers</td>
<td>3</td>
</tr>
<tr>
<td>Annual investment management fees</td>
<td>61 bps (approx. $2.7 million)*</td>
</tr>
<tr>
<td>Projected tracking error (active risk)</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

* Based on investment manager fee schedules and asset values as of 12/31/2021

Aon

Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
### SDCERS Return-Seeking Fixed Income Portfolio Relative to Benchmark

#### SDCERS Return-Seeking FI Portfolio

- **Corporate (USD)**: 7.8%
- **Cash**: 4.0%
- **Sovereign (USD)**: 35.9%
- **Sovereign (Local)**: 52.3%

#### SDCERS Return-Seeking FI Benchmark*

- **Sovereign (USD)**: 40.0%
- **Sovereign (Local currency)**: 60.0%

#### SDCERS’ Return-Seeking Fixed Income vs Custom Benchmark*

<table>
<thead>
<tr>
<th></th>
<th>SDCERS’ Return-Seeking Fixed Income</th>
<th>Custom Benchmark*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Duration</td>
<td>6.8 years</td>
<td>6.3 years</td>
</tr>
<tr>
<td>Yield to Maturity</td>
<td>6.1%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Credit Quality</td>
<td>Wellington: Baa2</td>
<td>JPM EMBI: Baa2</td>
</tr>
<tr>
<td></td>
<td>Stone Harbor: BBB</td>
<td>JPM GBI-EM: BBB+</td>
</tr>
<tr>
<td></td>
<td>Ninety One: BBB</td>
<td></td>
</tr>
</tbody>
</table>

- Portfolio is mostly in line with the custom benchmark, with an underweight to local currency EMD as of 12/31/2021
- Approximate 8% out-of-benchmark exposure to corporate emerging market debt

---

*Based on 12/31/2021 market values
*40% JPM EMBI Global Diversified and 60% JPM GBI-EM Global Diversified

Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
## Return-Seeking Fixed Income: Active Risk Decomposition

<table>
<thead>
<tr>
<th>Manager*</th>
<th>Allocation (%)</th>
<th>Active Risk (%)</th>
<th>Contribution to Active Risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellington</td>
<td>31.8%</td>
<td>1.4%</td>
<td>22.8%</td>
</tr>
<tr>
<td>Stone Harbor</td>
<td>35.0</td>
<td>2.6</td>
<td>60.2</td>
</tr>
<tr>
<td>Investec</td>
<td>33.2</td>
<td>1.4</td>
<td>24.4</td>
</tr>
<tr>
<td>Misfit Relative to Asset Class Benchmark</td>
<td></td>
<td></td>
<td>-7.4%</td>
</tr>
<tr>
<td><strong>Total Return-Seeking Fixed Income Active Risk</strong></td>
<td><strong>1.4%</strong></td>
<td><strong>100.0%</strong></td>
<td></td>
</tr>
</tbody>
</table>

- Aon expects the return-seeking fixed income portfolio as currently constructed to incur active risk of approximately 1.4%

Active Risk analysis based on policy allocations and trailing 5-years of historical monthly returns.
This page left blank intentionally
Agenda Tracker

Section 1  Executive Summary

Section 2  Public Market Asset Class Review
- U.S. Equity
- Non-U.S. Equity
- Global Equity
- U.S. Fixed Income
- Return-Seeking Fixed Income

Section 3  Alternative Asset Class Review
- Real Estate
- Private Equity and Infrastructure
- Opportunity Fund

Section 4  Conclusions and Next Steps

Section 5  Appendix
SDCERS – Real Estate

Current Long Term Policy Target Asset Allocation

- U.S. Equity, 17%
- Non-U.S. Equity, 14%
- U.S. Fixed Income, 22%
- Global Equity, 8%
- Emerging Market Debt, 5%
- Private Equity, 10%
- Real Estate, 11%
- Infrastructure, 3%
- Opportunity Fund, 10%

Role of Asset Class
- Diversification, Yield, Potential to Hedge Inflation, and Competitive Returns relative to the benchmark

Key Observations
- Allocation is currently below its long-term target at 9.4% vs. 11%
- The Core and Non-Core allocations are in line with the strategic target ranges on a funded and committed basis, but out of compliance on a funded basis

Recommendation
- Consultant and Investment Team continue to identify and vet attractive opportunities for consideration
Real Estate: Portfolio Funding Status and Composition

**PORTFOLIO OVERVIEW**  
(As of September 30, 2021)  
$ in millions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Investments</td>
<td>35</td>
</tr>
<tr>
<td>Total Commitments</td>
<td>$1,415.6</td>
</tr>
<tr>
<td>Unfunded Commitments</td>
<td>$239.6</td>
</tr>
<tr>
<td>Total Paid-In Capital</td>
<td>$1,643.3</td>
</tr>
<tr>
<td>Total Distributions</td>
<td>$1,249.1</td>
</tr>
<tr>
<td>Market Value (Net Asset Value or NAV)</td>
<td>$1,072.4</td>
</tr>
</tbody>
</table>

**PORTFOLIO COMPOSITION TO TARGETS**  
(As of September 30, 2021)

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Tactical Range</th>
<th>Unfunded Commitments + Funded (NAV)</th>
<th>Funded (NAV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target RE Allocation</td>
<td>11%*</td>
<td>6 - 16%</td>
<td>12.2%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Portfolio Style Composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Portfolio</td>
<td>70%</td>
<td>60% - 80%</td>
<td>70.9%</td>
<td>86.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Structural Core</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>56-80%</td>
<td>73.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tactical Core Equity</td>
<td>15.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0-24%</td>
<td>15.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tactical Core Debt</td>
<td>10.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0-15%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Non-Core Portfolio</td>
<td>30%</td>
<td>20% - 40%</td>
<td>29.1%</td>
<td>13.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value Add Portfolio</td>
<td>45.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0% - 40%</td>
<td>40.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Opportunistic Portfolio</td>
<td>54.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0% - 20%</td>
<td>59.7%</td>
</tr>
<tr>
<td>Leverage</td>
<td>≤50%</td>
<td>N/A</td>
<td></td>
<td>26.4%</td>
</tr>
</tbody>
</table>

- The funded real estate allocation, currently at 9.9%, is below the long-term target allocation of 11%  
  - The Funded allocation will increase as capital from new commitments is drawn down over the coming quarters
- The portfolio is in compliance with its Strategic Plan with respect to Core and Non-Core allocations on a funded and committed basis, but out of compliance on a funded basis
Real Estate: Portfolio Diversification

- SDCERS’ portfolio is diversified by both geographic region and property type
  - Overweight to industrials, which is expected to increase further over the coming year by design, and other*
  - Underweight to apartments, office and retail
  - Non-U.S. exposure consists primarily of exposures to Europe (2%) and Asia (1%)

*Other* exposure includes senior housing, student housing, self-storage, land, data centers, CMBS, and secondaries.

Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
SDCERS has diversification across vintage year and real estate style categories

- The significant Core allocation is primarily due to Core Open End ODCE Funds; Non-Core exposure is expected to increase moderately in the medium-term as the DWS IMA winds-down, open-end investments pay out redemptions, and unfunded commitments to Non-Core funds are funded

- SDCERS approved a commitment to 3 new funds in 2021, as of December 31, 2021
**Role of Asset Classes**
- Diversification, Attractive Return, Income-Odientation, Lower Volatility, Inflation Hedging

**Key Observations**
- Decoupled PE and Infra asset classes to better isolate roles and evaluate performance
- PE is above (13.3%) its long-term target of 10%
- Infrastructure is below (2.4%) its long-term target of 3%

**Recommendation**
- Advisors and Investment Team continue to identify and vet attractive opportunities for consideration

**Current Long Term Policy Target Asset Allocation**
- U.S. Equity, 17%
- Non-U.S. Equity, 14%
- Global Equity, 8%
- U.S. Fixed Income, 22%
- Real Estate, 11%
- Emerging Market Debt, 5%
- Opportunity Fund, 10%
- Private Equity, 10%
- Infrastructure, 3%

---

*Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.*
SDCERS – Private Markets Composition Data

- SDCERS’ portfolio is diversified by industry and broadly in line with the U.S. public equity market as represented by the S&P 500 Index

*As of 9/30/2021*
SDCERS – Private Markets Composition Data (cont’d)

- SDCERS has diversification across vintage year

SDCERS Private Markets Vintage Year*

- 2021, 14%
- 2020, 16%
- 2019, 9%
- 2018, 13%
- 2017, 13%
- 2016, 8%
- 2015, 1%
- 2014, 2%
- 2013, 4%
- 2012, 2%
- 2011 and Prior, 4%

Preqin Private Equity Vintage Year**

- 2021, 7%
- 2020, 13%
- 2019, 14%
- 2018, 14%
- 2017, 15%
- 2016, 12%
- 2015, 8%
- 2014, 6%
- 2013, 4%
- 2012, 3%
- 2011 and Prior, 5%

*Based on asset values as of 9/30/2021
**Source: Preqin as of 9/30/2021

Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
SDCERS Private Markets Fund Strategy*

- Buyout, 33%
- Venture Capital, 15%
- Growth Equity, 23%
- Mezzanine, 3%
- Pooled, 6%
- Distressed, 5%
- Infrastructure, 12%
- Energy, 3%

Preqin Private Equity Fund Strategy**

- Buyout, 25%
- Venture Capital, 17%
- Growth, 9%
- Private Debt, 4%
- Real Estate, 11%
- Infrastructure, 8%
- Natural Resources, 2%
- Mezzanine, 2%
- Distressed Debt, 5%
- Other***, 17%

- SDCERS’ portfolio is diversified by strategy type and broadly in line with the opportunity set as reported by Preqin

*Based on asset values as of 9/30/2021
**Source: Preqin as of 9/30/2021
***Other includes fund-of-funds, co-investments, secondaries, balanced, special situations, and turnaround
SDCERS’ portfolio is diversified by both geographic region and vehicle type.

* Based on asset values as of 9/30/2021
SDCERS – Opportunity Fund

Role of Asset Class
- Growth, Diversification, Opportunistic, Investment Dislocation, Flexibility

Key Observations
- Allowable allocation is 0% to 10%
- Current portfolio split between distressed credit, real estate debt, and managed futures
- Invested allocation represents approx. 6.0% of Total Fund as of 12/31/2021

Recommendation
- Aon and SDCERS continue to identify and vet attractive opportunities

Current Long Term Policy Target Asset Allocation

- U.S. Equity, 17%
- Non-U.S. Equity, 14%
- Global Equity, 8%
- U.S. Fixed Income, 22%
- Emerging Market Debt, 5%
- Real Estate, 11%
- Private Equity, 10%
- Infrastructure, 3%
- Opportunity Fund, 10%
SDCERS Opportunity Fund Overview

Current Strategy Allocation (Based on Commitment Amount)

Managed Futures, 49%

Real Estate Debt, 20%

Private/Distressed Credit, 31%

Commitment Allocation $670 Million

Lynx 23%
Systematica 18%
Torchlight IV 7%
Grosvenor 3%
Torchlight V 3%
DK SOF III 7%
DK SOF IV 7%
Oaktree 7%

<table>
<thead>
<tr>
<th>Fund Name</th>
<th>Total Commitment ($M)*</th>
<th>% Funded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torchlight IV</td>
<td>$50</td>
<td>100%</td>
</tr>
<tr>
<td>Grosvenor</td>
<td>$120</td>
<td>100%</td>
</tr>
<tr>
<td>Torchlight V</td>
<td>$20</td>
<td>80%</td>
</tr>
<tr>
<td>Davidson Kempner III</td>
<td>$50</td>
<td>100%</td>
</tr>
<tr>
<td>Davidson Kempner IV</td>
<td>$50</td>
<td>53%</td>
</tr>
<tr>
<td>Oaktree II</td>
<td>$50</td>
<td>66%</td>
</tr>
<tr>
<td>Systematica</td>
<td>$200</td>
<td>100%</td>
</tr>
<tr>
<td>Lynx</td>
<td>$130</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total Commitment</strong></td>
<td><strong>$670</strong></td>
<td><strong>93%</strong></td>
</tr>
</tbody>
</table>

* As of December 31, 2021

Aon
Investment advice and consulting services provided by Aon Investments USA Inc., an Aon Company.
### Opportunity Fund Framework

<table>
<thead>
<tr>
<th><strong>Investment Objective</strong></th>
<th>What risks are we trying to address or what opportunities are we trying to take advantage of?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Identify market risk/opportunity being targeted for more “opportunistic-type investments”, and/or</td>
</tr>
<tr>
<td></td>
<td>- Identify portfolio benefits that investment provides that long-term strategic asset allocation does not</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>New Investment Risks</strong></th>
<th>What risks (new or increased) do such investments bring?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Identify new sources of risk or increases in types of risk that would result from pursuing such a strategy</td>
</tr>
<tr>
<td></td>
<td>- Identify environments when strategy will not be successful</td>
</tr>
<tr>
<td></td>
<td>- Identify risk mitigating factors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Implementation Strategy</strong></th>
<th>What should be the focus of implementation?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Identify the precepts that will drive manager/strategy selection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other Factors:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Fees</td>
</tr>
<tr>
<td></td>
<td>- Liquidity/Lock-up provisions</td>
</tr>
<tr>
<td></td>
<td>- Transparency</td>
</tr>
<tr>
<td></td>
<td>- Leverage</td>
</tr>
<tr>
<td></td>
<td>- Benchmarking</td>
</tr>
</tbody>
</table>
Agenda Tracker

Section 1  Executive Summary

Section 2  Public Market Asset Class Review
- U.S. Equity
- Non-U.S. Equity
- Global Equity
- U.S. Fixed Income
- Return-Seeking Fixed Income

Section 3  Alternative Asset Class Review
- Real Estate
- Private Equity and Infrastructure
- Opportunity Fund

Section 4  Conclusions and Next Steps

Section 5  Appendix
Conclusions

- We believe SDCERS’ portfolio structure is appropriate given SDCERS’ goals
  - Portfolio structure well-crafted with a deliberate allocation of active risk
  - Meaningful allocation to alternatives, where probability of enhanced alpha is greater
  - Increased efficiency within public markets
    - Global market exposure across public equities
    - Low-cost passive management in highly efficient markets
    - Focused active management in areas with greatest probability of success
    - Thorough due diligence and selection of high conviction active managers
  - Constant exploration and consideration for attractive and new or opportunistic investments for potential fit within the Opportunity Fund

- No recommendations as a result of the 2022 structure review
  - Aon continues to work with SDCERS Investment Team on the manager construct of the return-seeking fixed income allocation
  - Aon believes the high-quality, core make-up of the risk-reducing fixed income allocation continues to be appropriate
Agenda Tracker

Section 1  Executive Summary

Section 2  Public Market Asset Class Review
- U.S. Equity
- Non-U.S. Equity
- Global Equity
- U.S. Fixed Income
- Return-Seeking Fixed Income

Section 3  Alternative Asset Class Review
- Real Estate
- Private Equity and Infrastructure
- Opportunity Fund

Section 4  Conclusions and Next Steps

Section 5  Appendix
## SDCERS’ Portfolio Structure: Look Back at Equity

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Modifications Since 2010</th>
<th>Associated Theme</th>
</tr>
</thead>
</table>
| **U.S. Equity** | • Meaningfully increased passive management  
• Decreased number of active managers from 11 to 1  
• Eliminated small cap overweight relative to broad market  
• Tracking error decreased to 0.4%, from 2.5% in 2010 | • U.S. markets extremely efficient; low probability of active manager success  
• Focus active management in high conviction strategies; pay little for beta  
• Previously, small cap bias explained half of active risk, reduced as outlook did not support level of bias  
• Target diversified sources of alpha |
| **Non-U.S. Equity** | • Introduced meaningful level of passive management  
• Decreased active risk to 0.8%, from 3.3%  
• Added dedicated Emerging Markets (EM) managers to increase EM exposure to in line with opportunity set | • Non-U.S. markets efficient  
• Focus active management in high conviction strategies; pay little for beta  
• Gain broad exposure in line with full opportunity set  
• Utilize active management where probability of success higher, i.e., emerging markets & small caps |
| **Global Equity** | • Added 5% Global Equity allocation  
• Hired 2 active managers  
• Subsequently added an additional 3% and hired 2 additional active managers | • Most advantageous utilization of active risk budget  
• Represents an integrated and efficient means for investing in stocks across the world  
• Focuses on capturing managers’ skill by giving discretion to invest in stocks regardless of style, capitalization or securities’ country of origin |
## SDCERS’ Portfolio Structure: Look Back at Fixed Income

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Modifications Since 2010</th>
<th>Associated Theme</th>
</tr>
</thead>
</table>
| Return-Seeking Fixed Income | • Added EMD allocation; hired 3 active managers  
                          • Modified mandate to 60/40 local/dollar denominated (hard) currency split  
                          • In process of broadening mandate to include other return-seeking fixed income sectors such as high yield and bank loans | • EMD provides compelling diversification given the low-to-moderate correlation to major asset classes  
                          • Broadening exposures will provide increased diversification and additional sources of alpha |
| Fixed Income        | • Modified active mandates to ‘core-plus light,’ to ensure a higher quality orientation with additional flexibility to add alpha when appropriate  
                          • Lowered duration to intermediate orientation | • Align with goal to effectively diversify equity risk and provide downside protection  
                          • Serves as additional liquidity source for benefit payments and other plan expenses |
<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Modifications Since 2010</th>
<th>Associated Theme</th>
</tr>
</thead>
</table>
| Real Estate 1          | • Consolidated IMA program and started liquidation and transition to Core commingled funds  
• Elimination of REIT allocation  
• Recommended 6 Structural Core and 3 Tactical Core strategies for redeployment of IMA capital and fund redemptions  
• Expanded allocation to include Core Debt  
• Committed to 24 new non-core funds from 2010-2021                                                                 | • Continue liquidation of IMA holdings  
• Consolidate Core investments  
• Increase allocation to Tactical Core / Core Plus  
• Target U.S. sector specific, value-added funds for Non-Core  
• Evaluate Co-investment opportunities  
• Explore secondary market sale of low conviction investments                                                                                     |
| Private Equity         | • Increased Private Equity target from 5 to 10%  
• Decoupled from Infrastructure and changed to a primary peer benchmark and secondary opportunity cost benchmark                                                                                       | • Focus active risk in areas expected to provide greatest value-add  
• Focus on secondaries and co-investments as opportunities arise  
• Better evaluate success and role                                                                                                               |
| Infrastructure         | • Added 3% Infrastructure target  
• Decoupled from Private Equity  
• Changed benchmark to better evaluate role and expectations                                                                                   | • Focus active risk in areas expected to provide greatest value-add  
• Better evaluate success and asset class role                                                                                                    |
| Opportunity Fund       | • Incepted in 2011  
• Commitments comprise 6.0% of Total Fund (as of 12/21)  
• Diversified portfolio of distressed credit, real estate debt, and managed futures                                                                 | • Enhance return and/or reduce risk  
• Provide flexibility to efficiently invest in attractive opportunities  
• Offer returns uncorrelated with traditional markets                                                                                           |
SDCERS’ Active Risk: Background and Assumptions

- Active risk analysis is forward-looking
  - Based on current asset allocation and manager line-up
- Focuses on publicly-traded security asset classes; excludes illiquid private market asset classes
- Analyze sources that contribute to active risk
  - Asset class level, including impact of biases (for instance, small cap overweight)
  - Manager level (risk due to manager active bets)
- Utilize 60 months of historical return data
- Similar to other statistical / quantitative tools, the active risk budgeting tool has limitations
  - Does not incorporate illiquid, private market assets
  - Historical tracking error may not be a good estimate of future tracking error if there are changes to the portfolio manager / team or structural changes in the marketplace
  - As a result, it is important to overlay quantitative results with sound qualitative judgment for the active risk modeling tool to be useful and meaningful
Utilizing Active Risk Budgeting to Guide Implementation

- Overall, we believe that the active risk budgeting is a useful framework to guide implementation of an investment program
  - Are we comfortable with the level of active risk?
  - Are we taking active risk in asset classes / segments of the market that we believe would be rewarded?
  - Are active risk allocations to managers consistent with our expectations for the managers’ value-add?

- Active risk target guides
  - Level of active / passive exposure across asset classes, based on expectations for value-add
  - Number and types of managers to be utilized
  - Extent of biases relative to the market opportunity set
  - Help assess how changes to investment structure (active/passive, etc.) / managers alter the level of / contribution to active risk
U.S. Equity Portfolio Skyline

Source: Aon, Style Research. Portfolio Skyline Data as at 31 December 2021
Distribution and TE Data as at 31 December 2021. Benchmark: DJ US TSM Index
Non-U.S. Equity Portfolio Skyline

Source: Aon, Style Research. Portfolio Skyline Data as at 31 December 2021
Distribution and TE Data as at 31 December 2021. Benchmark: MSCI ACWI ex-US IMI
Total Public Equity Portfolio Skyline

Source: Aon, Style Research. Portfolio Skyline Data as at 31 December 2021.
Distribution and TE Data as at 31 December 2021. Benchmark: MSCI ACWI IMI
Portfolio Skyline:

- The skylines are designed to answer the question "How significantly different is the portfolio from the benchmark?" in respect to Style factors which are important in equity markets.
- The first six bars from the left are value factors (shown as blue bars) while the next four bars are growth factors (green bars). The next six bars are quality factors (amber) whilst the dark and light grey bars represent momentum and risk factors, respectively.
- A bar above the axis indicates that the portfolio has a positive tilt towards that factor e.g. in the case of value factors, if the bar is above axis then the portfolio has a tilt towards cheaper companies.
- As a general rule of thumb, for any individual Style tilt:
  - Style tilts less than -0.5 or more than +0.5 indicate a tilt is observable
  - Style tilts less than -1 or more than +1 are significant

Value measures:

- **Book to Price** - The ratio of the company’s Book Value (the sum of Shareholders’ Equity plus accumulated Retained Earnings from the P & L Account) to its Share Price.
- **Sales to Price** - Net Sales per Share divided by the Share Price.
- **Dividend Yield** - The annual Dividend Paid per Share divided by the Share Price.
- **Earnings Yield** - Annual Earnings (adjusted for Amortizations of Intangibles, Extraordinary charges and credits) per Share divided by the Share Price.
- **Free cash flow Yield** - Annual Cash Flow per share minus Capital Expenditure per share divided by the share price. Free cash flow is the amount of money available to the company after paying out for the maintenance and renewal of fixed assets
- **Cyclically Adjusted Earnings Yield** – 10 year average of cyclically adjusted annual earnings (adjusted for Amortizations of Intangibles, Extraordinary charges and credits) per Share divided by the Share Price.
- **Total Shareholder Yield** – The sum of Net Buyback Yield and Net Debt Paydown yield. This factor measures the proportion of a company’s value distributed to shareholders through dividend payments, share repurchases and debt reduction.
Growth measures:
- Earnings Growth - The average annual growth rate of Earnings (adjusted for Amortizations of Intangibles, Extraordinary charges and credits) over a trailing three years.
- Sales Growth - The average annual growth rate of Net Sales per Share over a trailing three years.
- IBES 12M Growth - IBES consensus forecast growth of Earnings over the next twelve months.

Quality measures:
- Return on Invested Capital - (Net Income + ((Interest Expense on Debt - Interest Capitalized) * (1-Tax Rate))) / Average of Last Year's and Current Year's (Total Capital + Short Term Debt & Current Portion of Long Term Debt). The Return on Invested Capital (also known as Return on Capital) measures the profitability of a company as measured by its operating income in relation to the total capital invested in the company.
- Return on Equity - Net Income before Preferred Dividends divided by the Book Value of Shareholders’ Common Equity.
- Income to Sales - The "net margin", annual Net Income before Preferred Dividends (plus Policyholders’ Surplus for insurance companies), divided by annual Net Sales.
- Earnings Growth Stability - This ‘Quality’ factor is calculated as the negative of the standard deviation of Earnings Growth over the most recent 5 years of growth data.
- Gross Profit to Assets – Gross Profits divided by Total Assets. Gross profit is a company's total revenue minus the cost of goods sold. Gross profit may be preferred as an alternative over earnings or free cash flow to consider a company’s true economic profitability without subtracting expenses that may in fact be increasing a company's production advantage or competitive advantage e.g. advertising, R&D, or capital expenditure. Gross profits are divided by assets, not shareholder’s equity, because gross profits exclude interest payments, and are therefore independent of leverage.
- 3 Year Asset Growth – The average annual growth rate of total assets over a trailing three years.
- Asset Turnover - Net Sales /Total Assets. The asset turnover ratio is an indicator of how efficient a company is in deploying its assets to generate revenue.
- Low Gearing - The negative of Debt to Equity. Low geared companies can regarded as being of higher "Quality" as they are less burdened by debt repayment costs.
Momentum measures:

- **ST Momentum** - Calculated using a 6 month "memory" of monthly total returns. The past period returns are weighted using a "decay ratio" of $2/3$, per month.
- **Momentum 12-1** – The total return of the stock over the last 12 months, excluding the total return over the most recent month since reversal effects are often associated with one-month returns.
- **IBES 12M Earnings Revisions** - IBES balance of Earnings forecast revisions for the next annual reporting period.

Low Volatility measures:

- **3 Year Volatility** – The standard deviation of the last 36 months of total returns, expressed as an annualized percentage.
- **5 Year Volatility** – The standard deviation of the last 60 months of total returns, expressed as an annualized percentage.
- **Market Beta** - The "slope coefficient" from the simple regression.
Risk measures:

▪ Market Capitalisation - The average Size statistic of a portfolio is the weighted (by holding value) average size of the securities held. The average Size statistic of a benchmark (or total market) is the weighted (by holding value) average size of the securities within the benchmark (or total market). If the bar is above the line, there is a large cap bias whilst a bar below the line indicates a mid/small cap bias.

▪ Market Beta – The "slope coefficient", (β), from the simple regression: Security Monthly Return = α + β * Market Monthly Return + Random Error. The regression is carried out over 36 month periods; where sufficient information is not available, β=1 is assumed.

▪ Exposure to GDP Shock Beta – Based on the equation: Quarterly Share Price Return of Security n = αn + βn GDP Shock. Where GDP Shock is the difference between the most recent GDP quarterly growth rate and the average of the previous 4 quarters. A number of, say, 2.5 would mean that a GDP growth rate of 1% (quoted at an actual quarter to quarter rate) above the average of GDP growth rates recorded over the previous 4 quarters would result in the value of the stock/sector/portfolio being 2.5% (= 2.5 x 1%) higher in the current quarter than would otherwise have been.

▪ Exposure to Inflation Beta – Based on the equation: Monthly Share Price Return of Security n = αn + βn Monthly Inflation Rate. Where Monthly Inflation is quoted at an annual rate. A number of, say, 0.8 would mean that a rise in the annual rate of inflation by 1% (quoted at an annual rate) would result in the performance of the stock/sector/portfolio being 0.8% (= 0.8 x 1%) stronger in the current month than would otherwise have been.

▪ Exposure to Oil Beta - Based on the equation: Monthly Share Price Return of Security n = αn + βn Oil Price Return. Where the Oil Price Return is the monthly per cent change in the Oil Price, in US dollars. A number of, say, 0.7 would mean that an increase of 1% in the US dollar price of oil would result in the value of the stock/sector/portfolio being 0.7% (= 0.7 x 1%) higher in the current month than would otherwise have been.
Decomposition of Active Risk:
- Risk attribution breaks down the Tracking Error into the main sources of risk i.e., from currency allocation, market (country) allocation, sector allocation, Style allocation and stock selection (or equity risk). These are displayed as percentages and provide further insights into the sources of risk in a portfolio.

Risk Measures:
- Tracking Error - Estimate of the expected relative volatility of the portfolio versus the benchmark and is expressed as an annualised percentage.
- Benchmark Overlap – Measure of the percentage of stock holdings in a manager's portfolio that differ from the benchmark index. A high Active share indicates large differences between the portfolio and benchmark in terms of holdings while a portfolio with a low active share will conclude that there is a reasonable overlap between the portfolio and the benchmark.
- Number of Stocks - The number of stocks contained in the portfolio.

Relative Style Distribution:
- The distribution shows the relative style distribution analysis according to Market Cap and Book to Price based on the Benchmark.
- Large, Mid, Small = Market Cap (70%, 20%, 10%); Value, Growth = Book to Price (50%, 50%).