Purpose Behind Benchmarks

- To represent a broad asset class and reflect a portfolio construction methodology
- To measure relative performance
Preferred Attributes of Good Benchmarks

- **Representative**
  - Benchmark is appropriate and relevant to the portfolio’s investment strategy

- **Investable**
  - Should be able to invest in all of the securities included in the benchmark

- **Transparent**
  - Names and weights of securities comprising the benchmark are available and understandable

- **Measurable**
  - Benchmark is readily calculable on a frequent basis

- **Independent**
  - Calculated by an independent third party to ensure a fair comparison
Static versus Dynamic

- **Static** – fixed weighting of sub-components in benchmark
  - Allows for intentional over or under weighting of portfolio
  - During times of transition, it is likely that unintentional bets are being made versus benchmark which could lead to underperformance

- **Dynamic** – weights of benchmark sub-components are adjusted to match actual weights of portfolio
  - No unintentional bets are being made (removes all allocation effect)
  - During times of transition, unintentional over or under weights are eliminated
  - Performance is driven solely by manager selection
NCRS Benchmarks – Total Plan

- **Current**
  - Static weighting based on short term allocation targets

- **Proposed – Transition**
  - Dynamically weighted using actual monthly allocation weights as benchmark weights

- **Proposed – Long Term**
  - Static weighting using long term allocation targets

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Current (Static)</th>
<th>Transition (Dynamic)*</th>
<th>Long Term (Static)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Equity Benchmark</td>
<td>47.0%</td>
<td>47.4%</td>
<td>40.5%</td>
</tr>
<tr>
<td>Fixed Income Benchmark</td>
<td>38.0%</td>
<td>37.5%</td>
<td>38.0%</td>
</tr>
<tr>
<td>Real Estate Benchmark</td>
<td>6.0%</td>
<td>5.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Alternative Benchmark</td>
<td>4.5%</td>
<td>4.6%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Credit Benchmark</td>
<td>3.0%</td>
<td>3.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Inflation Benchmark</td>
<td>1.5%</td>
<td>2.0%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

*Dynamic weighting as of 4-30-11*
NCRS Benchmarks – Global Equity

- **Current**
  - Static weighting between US & Non-US based on short term allocation targets

- **Proposed**
  - Dynamically weighted between:
    - US (Russell 3000 Index)
    - Non-US (MSCI ACWI ex US IMI Index)
    - Global (MSCI ACWI Index)

<table>
<thead>
<tr>
<th></th>
<th>Current (Static)</th>
<th>Proposed (Dynamic)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US - Russell 3000</td>
<td>60.0%</td>
<td>47.2%</td>
</tr>
<tr>
<td>Non US - MSCI ACWI ex US IMI</td>
<td>40.0%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Global - MSCI ACWI</td>
<td>0.0%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

*Dynamic weighting as of 4-30-11
NCRS Benchmarks – Fixed Income

- Current
  - Static
  - BOA Merrill Lynch Custom: 40% Gov’t 5+ yr / 35% Investment Grade Corporate Credit (BBB – max 25%) / 25% Mortgage Master

- Proposed
  - No Change

<table>
<thead>
<tr>
<th></th>
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<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government 5+ yr</td>
<td>40.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>Investment Grade Corp Credit (BBB – max 25%)</td>
<td>35.0%</td>
<td>35.0%</td>
</tr>
<tr>
<td>Mortgage Master</td>
<td>25.0%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>
NCRS Benchmarks – Real Estate

- Current
  - Static weighting between:
    - Private Real Estate  (NCREIF ODCE)
    - Public REITS (FTSE EPRA/NAREIT Global Securities Index)

- Proposed – Transition*
  - No change

- Proposed – Long Term
  - Static blend of Core, Opportunistic, Value Add, REIT, and Timber

<table>
<thead>
<tr>
<th></th>
<th>Current (Static)</th>
<th>Transition (Static)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Real Estate - NCREIF ODCE</td>
<td>90.0%</td>
<td>90.0%</td>
</tr>
<tr>
<td>Public REITS – FTSE EPRA/NAREIT Global Securities Index</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

* The timber allocation will be moved to the Real Estate Portfolio as of 7/1/11
NCRS Benchmarks – Alternatives

- Current
  - Static weighting between Private Equity and Hedge Funds
- Proposed
  - Dynamic weighting between Private Equity and Hedge Funds

<table>
<thead>
<tr>
<th></th>
<th>Current (Static)</th>
<th>Proposed (Dynamic)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Equity Benchmark</td>
<td>85.0%</td>
<td>87.1%</td>
</tr>
<tr>
<td>Hedge Fund Benchmark</td>
<td>15.0%</td>
<td>12.9%</td>
</tr>
</tbody>
</table>

*Dynamic weighting as of 4-30-11
NCRS Benchmarks – Private Equity

- Current - Russell 3000 lagged 3 months + 250bps
  - Public benchmark represents long term goal of private equity outperforming the public markets
  - Creates large amount of tracking error since public and private market returns are not closely correlated
  - Since tracking error is high, using a public benchmark would take up a relatively large amount of the risk budget within our risk management platform

- Proposed - Custom Cambridge Associates Benchmark
  - Large Peer Universe (>4300 funds)
  - Allows for creation of a customizable benchmark which is more representative of the private equity portfolio (PE ex energy/mezz)

- Other options considered:
  - State Street All Private Equity Index
  - Venture Economics
  - Private iQ
NCRS Benchmarks – Hedge Funds

- Current - UST-Bill + 400bps
  - Current portfolio structure is not consistent with this
    - Leads to unintended tracking error
  - Hedge Funds can produce negative returns

- Proposed - HFRI Fund of Funds Conservative
  - All active funds within the Hedge Fund portfolio are Fund of Funds
NCRS Benchmarks – Credit

- Current - 7.5% Annualized Return
  - Absolute return benchmark achieves long term goal of outperforming 7.25% actuarial rate of return
  - Not representative of investment strategy which creates unintended tracking error

- Proposed - 50% HFRX Distressed Index / 20% HFRX Relative Value Index / 15% ML High Yield Index / 15% CS Leveraged Loan Index
  - Represents long term strategic target to underlying sub-components of asset class
    - Portfolio construction methodology
NCRS Benchmarks – Inflation

- **Current**
  - CPI + 300 bps

- **Proposed – Transition***
  - Dynamically weighted between:
    - Commodities (DJUBS Commodities Total Return Index)
    - Private Energy (Cambridge Associates Energy Upstream & Royalties and Private Equity Energy Benchmark)

- **Proposed – Long Term**
  - Static weighting using long term allocation targets

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