PORTFOLIO IDEAS FOR PUBLIC PLANS

Public Pension Funding Forum

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Nuveen Asset Management

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The purpose of this presentation is to focus on investment portfolio strategies designed to close public plans’ funding gaps while maintaining a “liability-aware” framework.

We will discuss:

- How plans may quantify the risks they are taking from an asset/liability perspective
- The role of fixed income for public plans
- Specific immunization and managed volatility strategies that public plans may employ
Hypothetical Public Plan – Key Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Discounting Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assumed Rate of Return</td>
</tr>
<tr>
<td>Liability Value</td>
<td>$1,000,000,000</td>
</tr>
<tr>
<td>Single Rate Equivalent</td>
<td>7.65%</td>
</tr>
<tr>
<td>Funded Ratio</td>
<td>75.00%</td>
</tr>
</tbody>
</table>

### Hypothetical Plan Payment Profile

- **Plan Payments**
- **Cumulative Plan Payments (%)**

- **Year**
- **Payment ($ millions)**
- **Cumulative Payment**

**Average liability maturity: 19 years**
**Cumulative payments total: $2.9 billion**

### Hypothetical Asset Allocation ($750 M)

- **Equity Mid/Small Cap**
- **International Global Equity**
- **Equity Large Cap**
- **International Equity EM**
- **Alternatives**
- **Fixed Income - Core**

Source: Nuveen Asset Management.
The “Black Hole” Scenario

Source: Nuveen Asset Management.
Simulating Hypothetical Plan Contributions

**Simulation Assumptions**

- Starting funded ratio is 75%, discounting the plan’s liability payments at 7.65%
- Starting size of investment portfolio is $750 million
- Starting liability present value is $1 billion
- The sum of all liability cash flows total $2.9 billion
- Assume contributions to increase the funded ratio from 75% to 100% over 10 years in 2.5% funded-ratio increments

<table>
<thead>
<tr>
<th>Expected PV of contributions:</th>
<th>$278 M</th>
</tr>
</thead>
<tbody>
<tr>
<td>95th percentile PV:</td>
<td>$581 M</td>
</tr>
<tr>
<td>5th percentile PV:</td>
<td>$32 M</td>
</tr>
<tr>
<td>Range of contributions (95th – 5th percentile):</td>
<td>$548 M</td>
</tr>
<tr>
<td>Downside volatility (95th percentile - expected):</td>
<td>$303 M</td>
</tr>
</tbody>
</table>

Source: Nuveen Asset Management.
The Role of Fixed Income – Rolling Immunization

Source: Nuveen Asset Management.

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## Hypothetical Immunization Portfolio

<table>
<thead>
<tr>
<th>Measure</th>
<th>Immunization Strategy</th>
<th>Barclays Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Duration</td>
<td>2.54</td>
<td>5.52</td>
</tr>
<tr>
<td>Average Maturity</td>
<td>5.05</td>
<td>7.5</td>
</tr>
<tr>
<td>Average Quality</td>
<td>A-</td>
<td>AA</td>
</tr>
<tr>
<td>Yield to Worst</td>
<td>3.40%</td>
<td>2.34%</td>
</tr>
<tr>
<td>Fixed Rate</td>
<td>43%</td>
<td>100%</td>
</tr>
<tr>
<td>Floating Rate</td>
<td>57%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Quality Distribution

- **BBB**: 16.8%
- **BB**: 12.9%
- **B**: 9.3%
- **A**: 19.2%
- **AA**: 33.1%
- **Treasury**: 4.3%
- **Agency**: 4.3%

### Sector Allocation

- **ABS**: 4.4%
- **Utility**: 4.7%
- **CLO**: 14.4%
- **CMBS**: 14.4%
- **Industrial**: 25.4%
- **Financial**: 26.4%
- **Treasury**: 4.3%
- **Agency Debentures**: 4.3%
- **Municipal**: 1.8%

Sources: Nuveen Asset Management, Barclays. As of September 30, 2013.
Diversification does not insure against market loss.
See disclosure regarding average credit quality methodology and limitations.
Analysis:
Hypothetical 70% Equity / 30% Fixed Income Portfolio

Past performance is no guarantee of future results.
The equity portion of the portfolio is represented by the MSCI ACWI Index and the fixed income portion is represented by the Barclays Aggregate Bond Index. The data provided is not intended to represent any Nuveen portfolio or predict future results. Indices are unmanaged and are not available to direct investment. The information provided is for illustrative purposes only and has been obtained from sources believed to be reliable, but is not guaranteed for accuracy or completeness.
Sources: Bloomberg, Nuveen Asset Management.
Past performance is no guarantee of future results. Value at Risk (VaR) represents a loss threshold that is expected to be exceeded in 5% of the trading days. For example, a $5,871,018 VaR indicates that there is a 5% probability of a loss greater than $5,871,018 on that particular day. The equity portion of the portfolio is represented by the MSCI ACWI Index and the fixed income portion is represented by the Barclays Aggregate Bond Index. The data provided is not intended to represent any Nuveen portfolio or predict future results. Indices are unmanaged and are not available to direct investment. The information provided is for illustrative purposes only and has been obtained from sources believed to be reliable, but is not guaranteed for accuracy or completeness.

Sources: Bloomberg, Nuveen Asset Management.
Analysis:
Hypothetical 70% Equity / 30% Fixed Income Portfolio

Volatility Management:
The hypothetical strategy stays within the target volatility range over 95% of the time

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Sources: Bloomberg, Nuveen Asset Management.
Hypothetical Strategy Comparison

Hypothetical Case Study – 60/40 Portfolio

- Assume you are able to perfectly forecast volatility
- Adjust exposure to 60/40 portfolio to keep volatility stable at 9%

<table>
<thead>
<tr>
<th></th>
<th>60/40</th>
<th>Vol-Mgd 60/40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized Return</td>
<td>9.3</td>
<td>14.7</td>
</tr>
<tr>
<td>Annualized Volatility</td>
<td>9.2</td>
<td>9.0</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>0.63</td>
<td>1.24</td>
</tr>
<tr>
<td>Up Capture</td>
<td>100%</td>
<td>116%</td>
</tr>
<tr>
<td>Down Capture</td>
<td>100%</td>
<td>77%</td>
</tr>
<tr>
<td>Maximum Drawdown</td>
<td>-31%</td>
<td>-17%</td>
</tr>
<tr>
<td>Max Drawdown Begin</td>
<td>Nov-07</td>
<td>Sep-00</td>
</tr>
<tr>
<td>Max Drawdown End</td>
<td>Feb-09</td>
<td>Sep-02</td>
</tr>
</tbody>
</table>

Source: Nuveen Asset Management. The 60/40 portfolio represents an unmanaged portfolio consisting of 60% S&P 500 Index and 40% Barclays Aggregate Index, rebalanced daily. The Vol-Mgd 60/40 portfolio represents a portfolio consisting of the 60/40 portfolio and cash. The weights assigned to the 60/40 portfolio and cash are determined monthly by the future volatility of the 60/40 portfolio so that the Vol-Mgd 60/40 portfolio maintains a volatility of 9.0%. The Vol-Mgd 60/40 is a theoretical portfolio illustrated here for purposes of discussion. It is not available for investment. Past performance is no guarantee of future results. Different benchmarks, economic periods and other methods and market conditions may result in significantly different outcomes. Indices are unmanaged and unavailable for direct investment.

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Key Takeaways

> Public pension plans should consider a “portfolio” approach to closing their funding gaps

> Plan sponsors should ensure their asset allocations meet their risk tolerance from a funded ratio and contribution perspective

> The role of fixed income should be examined from a tactical and strategic perspective

> Managed volatility strategies may be appropriate to limit downside risk of return-seeking asset allocations
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