A Treasurer's Perspective of Pension Risk: Managing the Journey to Full Funding

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BlackRock
Funded ratios have been volatile!

Funded ratio: Typical corporate pension plan*

*This graph does not intend to measure actual funding levels – it merely attempts to highlight changes over the period (the funding ratio is assumed to be 90% as of 12/31/2007). The assumed asset allocation is: 40% US equities, 20% International equities, 17.5% aggregate bonds, 17.5% long government/credit bonds and 5% real estate. The funded ratio is assumed to be 100% as of December 29, 2006. The liabilities are discounted using the ML AA discount curve. The graph assumes that contributions are equal to service costs and benefits.

Source: P&I, Datastream, BlackRock.
Equities and rates explain the risk

$1B pension plan – historic funded status attribution

Change in surplus ($ millions)

-400 -300 -200 -100 0 100 200 300 400


Source: BlackRock Solutions
Liability Driven Investing: Seeking the best way forward

- Old technology
- New technology

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Liability Driven Investing:
How much return is needed?

Example plan to achieve full funding over 10 year period

```
Target path
```
```
Realized performance
```
```
New path
```

Start       Year 1       Year 10

60%         70%          110%
70%         80%          100%
80%         90%          90%
90%         "Recalculating Route" 80%
100%        110%         70%
110%        60%          60%

2% p.a.      3% p.a.

"Recalculating Route"

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Where to spend risk? Forecasting rates is not easy

Successive quarterly forecasts versus the actual trend in 10-year note yields (represented by thick black line)

Source: Wrightson March 2013
Liability Driven Investing

- We suggest hedging liability interest rate risk and investing in a diversified portfolio of beta and alpha exposures.

All exposures

| Liability Hedge | Growth Portfolio |

Net exposures

| Growth Portfolio |

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Equity drawdowns can be painful

What is the alternative?

Source: BlackRock, MSCI World Hedged (100% to USD) TR index.
Designing the growth portfolio

1. Determine risk factors that drive asset class returns
2. Build a truly diversified portfolio
3. Prepare the portfolio for extreme environments
We need a better framework for understanding risk and return

High calorie content, but unbalanced

Balanced, but leaves you hungry

The solution?

Same amount of calories as a burger

As balanced as a salad
1. Risk factors explain asset class returns

- Inflation-protected bonds
- Corporate bonds
- Emerging Bonds
- Equities
- Small-cap Equity

Higher return asset classes
A diversified portfolio of risk factors outperforms conventional portfolios

Returns to a risk factor portfolio vs. the average DB Plan

Where do these returns come from?

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth of $1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>$1</td>
</tr>
<tr>
<td>1990</td>
<td>$2</td>
</tr>
<tr>
<td>1992</td>
<td>$4</td>
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<td>1994</td>
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<td>1996</td>
<td>$16</td>
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<td>2000</td>
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<td>2004</td>
<td>$256</td>
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<tr>
<td>2006</td>
<td>$512</td>
</tr>
<tr>
<td>2008</td>
<td>$1,024</td>
</tr>
<tr>
<td>2010</td>
<td>$2,048</td>
</tr>
<tr>
<td>2012</td>
<td>$4,096</td>
</tr>
</tbody>
</table>

Typical Pension  Risk Factor Portfolio

Source: Pensions & Investments, BlackRock.
Average portfolio based on aggregate asset policy of Top 200 DB Plans as of September 30, 2012 Risk Factor Portfolio consists of an allocation to 28% Real Rates, 11% Inflation, 10% Credit, 27% Economic, 17% Emerging and 7% Liquidity.
3. Manage exposures at extremes

A. When diversification fails:
   - Reduce risk pro-rata across the whole portfolio to limit drawdowns

B. When factors are extremely over or under valued:
   - Increase or decrease an individual factor exposure
The diversified portfolio has had lower risk in times of market stress

Rolling 60-day volatility MSCI World (US$ hedged) and Diversified Portfolio

As of 30 August 2013. Source: BlackRock; Past performance is not indicative or predictive of future results.
Return factor valuations

Long-term portfolio

Create a long-term efficient portfolio

Medium-term forecasts

Identify bubbles or buying opportunities

Scale: number of standard deviations away from the long-term average

-3 = unattractive
-2 = attractively expensive
-1 = fairly valued
0 = neutral
1 = cheap
2 = attractively cheap
3 = expensive

Source: BlackRock, 30 August 2013
Why allocate risk?

<table>
<thead>
<tr>
<th>Capital allocation</th>
<th>Risk allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% EQUITIES</td>
<td>11% BONDS</td>
</tr>
<tr>
<td>50% BONDS</td>
<td>89% EQUITIES</td>
</tr>
</tbody>
</table>

Source: BlackRock. Assumes zero correlation.
Managing the Journey to Full Funding

• Dynamically adjust portfolio as funded ratio changes
• Hedge liability interest rate risk
• Build a truly diversified growth portfolio