All Risks Are Not Created Equal

BY PHIL SCROFANI

Editor’s Note: This is a good primer for investment management consultants to use with their clients.

The widely accepted reason for the pension plan crisis is falling interest rates combined with falling equities. Reasons such as the burst of the technology bubble, September 11(th), increasing national debt, and the Iraq war generally are blamed as the root cause. These events may have shaped the economic environment, but investment strategies played a more important role in placing pension plans directly in the path of the perfect storm. Investment strategies have been based on measurements of risk where dangers were imperfectly understood or simply ignored. Today, these strategies are still in place and new techniques have the potential for even more dire effects. This article explains different risk measurements in the context of pension plan investing and how misinterpretation can threaten employee retirements.

What use is knowledge if there is no understanding? —Stobaeus

The perfect storm of falling equity prices and falling interest rates at the dawn of the new millennium revealed what can happen when market risk and interest-rate risk work together against pension plans. Most financial professionals acknowledge that this convergence created a situation where diversification and downside protection failed. In other words, “nothing could have been done” to defend pension plans from the storm; it was impossible to avoid the storm and its devastation. Or was it?

In the theater of pension plan management, many actors are responsible for employees’ future retirements. Government makes rules, actuaries build foundations, consultants offer solutions, investment managers shoot for targets, trustees oversee the process. In the recent pension crisis, all the actors share blame: They ignored tried-and-true strategies in favor of new-wave solutions that promised larger returns and smaller contributions.

Even with 20/20 hindsight, few can offer a solution that would have avoided the pension crisis using traditional asset allocation changes. Short of drastic measures, such as moving 100 percent of assets out of equity into real estate, strategies that would have called for diversifying away volatility risk would have provided little to no protection. The goal of many plan investment strategies over the past 10 years was to produce a high return at minimum risk by increasing equity allocation (see figure 1) so as to minimize current contributions. For example, last year a large public pension plan boasted of the highest returns in the state due to diversification of equities combined with allocations to real estate and hedge funds. Despite this success, however, the plan’s un-

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**FIGURE 1** Pension Asset Allocation, 1975–2006

![Graph showing pension asset allocation from 1975 to 2006 with Equity, Fixed Income, Cash, and Other categories. Source: Federal Reserve, EBRI/ICI Survey]

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derfunded liabilities rose more than 40 percent. Results such as these beg the question: Is there something wrong with current measures of risk if lowering them does nothing to improve, or even sustain, the health of a plan?

Pension plan strategists seek to reduce three measures of risk: standard deviation, beta, and duration gap. Each risk implies the possibility of loss. In reality, none measures the chance of loss; each measures predictability. The assumption is that increased predictability provides a controlled investment environment that can prevent loss, but the past seven years has proved that not always is the case. Implementing a strategy with the potential to provide security for beneficiaries in retirement demands that decision makers calculate the measure of risk and fully grasp and interpret the results to make better investment decisions. Diversification, hedging, and optimization are well understood within the financial community and are popular buzzwords on many marketing sheets. Lost in the decorative attempts to use these tactics to minimize risk is the understanding that volatility is not the only factor in determining loss.

Figure 2 summarizes common methods used to reduce risk. Each type of risk is explained by showing what it measures and how it can be reduced. An abstract pictorial of the risk measure and diagram of an associated investment approach provides visualization.

**Standard Deviation**
Standard deviation measures the volatility of returns and was the focus during the technology boom of the 1990s. The basis for modern portfolio theory is achieving greater returns with lower risk (standard deviation) by mixing assets with uncorrelated historical return patterns. Consistent, growing returns in the 1990s marketplace made theoretical models using optimization look like the Holy Grail for trustees. Analysis based on historical returns provided asset allocations that landed on efficient frontiers promising plan administrators they could make smaller contributions and increase employee benefits. It was an easy sell, because administrators bought into the sophisticated statistics while enjoying the opportunity to pass good news to their employers. But the perfect storm suggested that standard deviation was not the correct type of risk to reduce to secure pension plan obligations.

**Assets’ characteristics still typically are measured using standard deviation and total return.** Standard deviation is especially useful because all investments have a computable return with varying volatility whether...
**FIGURE 3** Optimization Inputs

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Expected Return</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riskless Rate</td>
<td>3.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Lehman Int G/C</td>
<td>5.70%</td>
<td>3.22%</td>
</tr>
<tr>
<td>ML HYS Master II</td>
<td>6.63%</td>
<td>7.22%</td>
</tr>
<tr>
<td>Russell 1000 Growth</td>
<td>8.40%</td>
<td>19.63%</td>
</tr>
<tr>
<td>Russell 1000 Value</td>
<td>11.40%</td>
<td>14.48%</td>
</tr>
<tr>
<td>Russell 2000 Core</td>
<td>10.94%</td>
<td>20.17%</td>
</tr>
<tr>
<td>Russell Mid Cap Core</td>
<td>13.17%</td>
<td>16.53%</td>
</tr>
<tr>
<td>MS EAFE</td>
<td>7.12%</td>
<td>14.88%</td>
</tr>
<tr>
<td>MS Emerging Markets</td>
<td>9.71%</td>
<td>23.81%</td>
</tr>
<tr>
<td>Benchmark</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blend</td>
<td>8.25%</td>
<td>9.32%</td>
</tr>
</tbody>
</table>

Return and Standard Deviation are the common statistics used to compare asset classes ignoring more relevant risks such as duration and reinvestment risk.

"ALL RISKS NOT CREATED EQUAL" CONTINUED

Comparing bonds with other asset classes using standard deviation is similar to comparing different vehicles using miles per hour (MPH) as the measurement. MPH easily would determine whether a bicycle, car, airplane, or hot-air balloon gets to the destination the fastest. Unfortunately, it ignores details such as cost, comfort, safety, entertainment, and most importantly, need. Surely an airplane would travel the fastest and may seem like the obvious answer, but what if the destination is 10 miles away? Most likely a car would be a better answer, unless of course the route takes you through downtown Washington, DC, at 5 p.m. on a Friday. Then a bicycle might be your best bet. To simplify asset allocation to one common statistic covering many different types of assets ignores each asset’s fundamental makeup and the ability to satisfy a wide range of constantly changing liabilities.

Combinations of securities with different risk-return characteristics create a hedge through diversification, lowering the risk and increasing probabilities of reaching the target goal. These combinations ignore, however, factors such as interest rate, credit, political, exchange rate, liquidity, opportunity, and reinvestment risks, each of which may be extremely important over short and intermediate time periods. Over longer time periods, short-term cyclical market swings turn into historical averages that produce more return for less risk. But with long-term returns being very hard to accurately predict and liabilities changing with interest rates and actuarial assumptions, matching for the long term must be monitored and updated regularly and be considered an ongoing process rather than a one-time event.

**Beta and Alpha**

Beta measures the sensitivity of an investment to market movements. Beta is a narrower measurement of risk than standard deviation because it represents risk relative to the market and is dependent upon the choice of benchmark. For example, if the investment is being compared with an index such as the Russell 1000 Value (benchmark beta always is 1.0) and has a beta of 1.2, then it will be 1.2 times more volatile and considered more risky. Yet the same investment may have a beta of 0.8 versus the Russell 1000 Growth and be considered less risky. Beta also is used with alpha in modern portfolio theory through linear regression to find an optimal portfolio, but because beta represents the nondiversifiable risk, it is not targeted as a risk that should be reduced.

Alpha is the excess return over the market. It is a measure of how much better or worse an investment did over what it was expected to do. High alpha suggests strength and success. Because average performance can be achieved by investing in market indexes, firms that manage money must justify fees by showing that they beat the index and by how much. Alpha is the statistic used to satisfy this measurement.

The most important and often ignored factor behind the usefulness of alpha and beta is correlation. An investment and the benchmark must have high correlation for these statistics to have meaning. In other words, the results are only relevant in comparing apples to apples. R-squared measures correlation and is expressed between 0.0 and 1.0. An R-squared of 0.75 or higher generally is considered acceptable for alpha and beta to have meaning. Otherwise the calculated beta has no significance and in turn alpha becomes irrelevant. Attempting to make meaningful conclusions with low correlation would be like calculating the volatility of a football team’s weekly scoring over a season using a baseball league’s scoring as the benchmark. Although the calculations will produce a result, the result will have no meaning.

The latest buzzword(s) in the investment management community is “portable alpha.” This measure uses beta to gauge risk. It is the newest concept for helping pension plans catch up to funded status. The purpose of portable alpha is to create a portfolio that reduces the volatility of the markets and isolates an investment’s excess return, or alpha. Risk is reduced by hedging market risk using leverage and short sales.
A short sale typically is done with a benchmarked index such as the S&P 500 or the Lehman Aggregate. The money saved by investing in derivatives is used toward the investment providing the alpha. Shorting the index removes the beta, or market risk, isolating the alpha. Hence, risk is reduced. But again, removing beta does not account for the specific risks of an individual plan’s liabilities.

Not surprisingly, advisors have been bombarding the investment industry with sales and marketing campaigns that highlight portable alpha as the savior of pension plans. Trustees, desperate to return to fully funded status, are inclined to embrace a strategy that might breathe life back into their plans. Portable alpha, however, is a complex strategy that should be fully understood before being considered. Trustees need to know that applying a portable alpha strategy is in essence turning the pension plan into a hedge fund. Many plans are asked to change investment policy guidelines in order to allow for the leverage necessary. This should be a red flag that encourages trustees to research every aspect and possible outcome that can result from this alternative strategy. Loosened rules were the catalyst for the savings and loan crisis in the 1980s. Although the intent was to give S&Ls leniency to help return them to solvency, the outcome was far different.

Portable alpha attempts to reduce (or remove) market risk as measured by beta, but pension plan strategies should be focused more on the future obligations. As with standard deviation, reducing beta can lower and even remove market volatility but may not lower the risk of covering liabilities.

**Duration**

Duration is a measure of interest rate risk that should be used to match assets with liabilities for pension plans. It measures the time it takes to receive the present value of future payments and is expressed in years. Modified and effective duration (which simply is referred to as “duration” in this paper and also is measured in years) measure the price sensitivity to interest rate movements. Because liabilities are discounted to present value to determine funded status, the movement of interest rates is the most important and relevant type of risk. Characteristically, liabilities can be viewed as the mirror image of zero coupon bonds (assets). Just like bonds, as interest rates change, the present value of the liabilities moves in the opposite direction. Higher durations signify greater swings in present value.

Figure 4 compares the change in the value of bonds versus liabilities with different durations. A group of liabilities (tranche²) with a $6-million present value is matched with a $6-million bond portfolio. Value for both the bonds and liabilities is calculated using the movement of 5-year Treasury yields. In this example the liabilities have a 7.89-year duration that suggests a 7.89-percent move in present value with a 1-percent move in interest rates. The fixed-income portfolio has a 4.53-year duration.

The $600,000 shortfall three years later is a result of this incorrectly matched duration. Had the asset duration matched the liability duration, the assets would be in line and little to no shortfall would exist. Hence the target for managing the portfolio is not that of a market index or a peer group but is dictated by the characteristics of the liabilities.

Because of these characteristics, most banks and insurance companies (including the Pension Benefit Guaranty Corporation [PBGC], the government agency that insures corporate pension plans) match liabilities using predominantly fixed-income portfolios with like duration to maintain coverage of expected obligations. These institutions take few risks with equities or alternatives because they are aware that failure means they are out of business. Yet pension plans do not seem to share the same sense of urgency. The reasons vary. In the case of government plans, a failed investment strategy can be bailed out by taxpayers. Unloading debt to the PBGC seems to be the most popular escape for corporate plans.

The perfect storm did great damage because of the temptation for large returns during the technology boom. Had interest-rate risk been the focus of asset allocation, this storm would have been a spring shower. Implementation of the Pension Protection Act of 2006 has tightened pension rules, funneling future strategies toward more secure,
to migrate from long-term targets to the intermediate and short term. When the bubble burst, many of these pensions plans dropped into underfunded status.

Although a strict immunization strategy may be appropriate when liabilities are fully vested, most pension plans have volatile nonvested liabilities, even in the short term, which require a more active form of asset management. Matching the cash flow of a bond portfolio with projected liabilities assumes that the liabilities change only with interest rates. In reality, future liabilities are based on fluctuating actuarial assumptions such as inflation, salary increases, hiring projections, benefit increases or decreases, etc. To hedge the investment risk while being adaptable to liability changes, an immunization strategy applied through active portfolio management is the most prudent.

There have been many arguments over the years as to whether perfect asset-liability matching is attainable because real-world interest rates have different effects on cash inflows than on outflows, creating an inherent mismatch. Reinvestment and credit risk may alter asset valuations causing investments to miss their marks. However, the slight discrepancy with asset-liability mismatch associated with reinvestment risk pales in comparison with the mismatch created for pension funds by traditional asset allocation techniques applied over the past decade.

Knowing is Not Understanding
A pension plan manager who doesn’t fully understand the meaning of statistical risk calculations will create asset-liability strategies that may attempt to answer the wrong question. Risk must be defined and understood before it can be reduced. Knowing how to run an application that produces an asset allocation that lands on an efficient frontier does not necessarily translate into security for payment of pension obligations. Understanding the application of an optimized portfolio is imperative.

Recent rule changes in Europe and the United States are forcing pension plans to move to more secure investment strategies based on fundamentals rather than theory. Active immunization strategies used in the short and intermediate term, combined with optimized portfolios built using modern portfolio theory in the long term, provide security and consistency to pension investing. Benefits earned by hard-working employees should not be left to hopes that the future acts the same as the past. The priority for fiduciaries should be to ensure payment of promised obligations rather than hunting for the cheapest approach to maintain the plan.

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Endnotes
1. Federal Reserve Statistical Release Flow of Funds Account of the United States 1945-2005; Employee Benefit Research Institute EBRI Issue Briefs #205, #218, #230, #239, #255, #272, #285, #296, and #308.
2. “Tranche” is defined here as the grouping of liabilities into buckets based on time, i.e., short tranche = 0–5 years, intermediate tranche = 6–20 years, long tranche = 21+ years.