Risks & Rewards

Actuaries
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ISSUE 52 AUGUST 2008

ARE WE FOOLED BY RANDOMNESS?

By Steve Scoles

Paul Depodesta, former assistant general manager of the Oakland A's baseball team tells a funny story about the news media:

In 2003, the A's star shortstop and previous year's league MVP Miguel Tejada was in his final year of his contract. Being a small market team with relatively low revenue, the A's decided that they simply did not have the money to sign Tejada to a new contract. Rather than have season-long uncertainty around the contract negotiations, they decided to tell Tejada and the media during spring training that while they would like to have Tejada on the team after the end of the season, they were simply not in a position to sign him to a new contract.

So, for the first six weeks of the season, Tejada's overall performance is poor and he has a batting average around .160. The media starts asking Depodesta if it's because Tejada doesn't have a contract. After being pushed several times, Depodesta tells the media that Tejada's performance likely has nothing to do with the contract and that he bets that by the end of the season, Tejada will have about the same production numbers as he did the last couple of years. But the media didn't bite. They continued to insist that Tejada was playing poorly because he didn't have a contract.

Lo and behold later in the season, Tejada picks up his play and his year-to-date statistics are pretty similar to those he racked up in previous years. One of the reporters who had hounded Depodesta earlier called him and asked, quite seriously, "Tejada's really picked it up. Do you think it's because he doesn't have a contract?"

This story illustrates how the media and its readers (me included) often try to find meaning in what is likely just noise. That is, we can get fooled by randomness.

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CHAIRPERSON'S CORNER

Every year, at the Society's annual meeting, the Investment Section Council has its own face-to-face "annual meeting." Part of that gathering is to hand over responsibilities for the council to the new chairperson, vice-chairperson, secretary and treasurer, and to welcome our newly elected council members. In my experience and from feedback from previous council members, this meeting is always a thoroughly enjoyable experience, as the council has the opportunity to exchange new ideas and enters the new "section year" with anticipation and enthusiasm.

So here we are, more than halfway into my tenure as chair of the Investment Section Council. It seems to me a natural time for the group to take stock. What have we achieved so far? What do we still need to accomplish in the months ahead to make a name for ourselves and to lay the foundation for the new council that will take the reins at October's annual meeting in Orlando?

Incoming council members have their work cut out for them right from the moment they adjourn from that first "annual meeting." It's important to remember that all members of the council are volunteers with limited availability. Our council began the year with lofty goals, and have enjoyed many successes. But we certainly have not achieved all we would have liked to in the first part of our term and are determined to make significant progress in a number of areas in the months ahead..That said, it's important to celebrate our successes to date.

COMMUNICATION IS ONGOING
We have continued the discipline of having a council meeting—via conference call—on the first Wednesday of every month. This was introduced by Cathy Ehrlich's council of last year, and is an excellent way of ensuring, at the very least, the group is communicating with each other on a regular basis.

WATCH FOR THE SURVEY
Our key, overarching objective as a council is to provide subscription-paying members of the Investment Section with "value-for-money." A couple of years ago, we conducted a survey of the membership that asked "how are we doing?" This gave members an opportunity to tell the council what the Section was doing well and what needed improvement. A follow-up survey has been conducted over the summer. The questionaire was organized in a layered format, to elicit specific comments on areas that matter to you. Where the section is doing well, we want to hear it. And where we can direct our efforts better, we want to know. We'll report back to you on this later in the year. Those of you who have more to say, don't worry! You will have the opportunity to dig deep into issues and let us know your thoughts on what we can do to better meet your needs.

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EYE ON EDUCATION

Each Section Council of the Society of Actuaries has a number of key things that the Society expects it to do—such as provide and/or sponsor a certain number of sessions at the Annual Meeting. But we have a lot of leeway when it comes to determining our focus and our success metrics.

A key objective for us in 2008 was to expand on what we are doing in the area of continuing education. While we believe we have continued to deliver our share of relevant and quality sessions at both the Spring and Annual Meetings—and of course our Investment Symposium continues to be our flagship offering for Investment Actuaries—we were particularly keen to expand the use of the webcast forum as a means of making continuing education more widely accessible. This followed the tremendously successful webcast run by the Section Council last year, where Charles Gilbert and Bob Reitano presented on the topic of quantitative methods in setting investment policy. Unfortunately, we have not yet held a subsequent webcast, but this forum remains an important one for us and is definitely one area we need to focus on in the future.

And before we get off the topic of continuing education, please be sure to look out for the Investment Section sessions at future meetings. For example at the Spring Meeting in Quebec City the Section ran a special "seminar-within-a-seminar" on the topic of modeling efficiency. Included on the team of impressive panelists was Yvonne Chueh, well known in the industry for the work she has been doing in the area of scenario reduction.

FOCUS ON RESEARCH

One other area the council is looking to improve is our input with regard to the Finance Research Committee. Our role in this area has traditionally been more "reactive" in that we provide input on research proposals. We need to step up our efforts and be much more proactive in this area. If you have any suggestions about key areas for potential research, please send them in—all ideas are welcome.

OUR NEWSLETTER

Risks and Rewards, of course, remains a major outlet for Section ideas, involvement, successes and areas of major interest for our Section and other Sections as well. Whether it is used as a forum for continuing education or research, or as a vehicle for actuaries to swap notes on investment related topics, the publication has been doing some great things for many years. We look forward to our newsletter continuing to be an effective medium for getting relevant and quality material in the hands of our members in a timely fashion.

VOLUNTEERISM

Ultimately, the work of the Section boils down to volunteerism. Our greatest achievements have been due to the members in the Investment Section who have the passion and drive to make things happen. If you think there is something we should be doing that we aren't—well, maybe then that's an opportunity for you to get directly involved. Sharing your time, talent and expertise benefits us all.

PASSING THE BATON

As the council heads into the second half of its tenure, we are starting to think about preparing the ground for the next council. You will all have seen the call for candidates for the upcoming elections. I'm delighted to say that we have been able to put together a really excellent roster for this year's election, with some very well-known and highly regarded candidates for the council. So our future looks like it will be in very good hands.

In conclusion, I want to extend my thanks to the 2008 council for a great effort this year so far. We've achieved a lot, and I can certainly say I have enjoyed the group's debates, which have always been lively, to say the least. I hope this edition's Chairperson's Corner has given you a little flavor for the internal workings of the Investment Section Council, and, you never know, maybe it will nudge one or two of you to drop us a line and get more involved. At least that's what we're hoping it will do! 💰

FOOLED BY RANDOMNESS

Fooled by Randomness is actually the title of a book written by Nassim Nicholas Taleb (who also wrote the recent best-seller *The Black Swan*). Taleb explores real-world randomness in the markets and in life … not the text book version we learn in our actuarial exams. Taleb, a former derivatives trader, shows the many dimensions of how we are constantly deceived by randomness.

Just one of the many aspects he covers is how we find "patterns" or stretch for meaning in what is really random data and how the news media helps us along in this process.

FINDING PATTERNS

One of the experiments Taleb notes in his book is an experiment the famous psychologist B.F. Skinner conducted with pigeons. The pigeons were placed in a large box and were delivered food on a completely random basis through a small opening.

Skinner was astonished to find that almost all of the birds developed an "extremely sophisticated rain-dance type of behavior" at feeding times. They displayed specific rituals such as moving their heads in a certain way that was related to their feedings. Even birds appeared to form links between their behavior and random information!

Other experiments have shown humans can find "patterns" in random data, even to the point of being insistent on their "patterns" after the experiment is concluded and they are shown that the data was random. As Taleb notes, "our bias is immediately to establish a causal link."

In Taleb's latest book, *The Black Swan*, he notes how psychologists have shown that theorizing (i.e., find-ing patterns) is an automatic behavior just like, say, breathing. That is, not theorizing requires effort. As Taleb summarizes, "It is almost impossible for our brains to see anything in raw form without some inter-pretation."

Much like the Oakland A's sports reporter had to link a baseball player's short-term poor play with something else that was happening, it is difficult for us to view things as independent.

To be clear, our amazing pattern-identifying abilities are critical to almost everything we do. It's just that in certain situations, these tools can fail us.

WE SEE WHAT WE WANT TO SEE

Taleb also notes that when we come up with a theory, we tend to only look for things that confirm it (also known as confirmation bias). The following experiment noted in *The Black Swan* illustrates this concept:

Subjects were given a sequence and were asked to determine the underlying generating process for it. The subjects could give the experimenters other sequences and would be told whether or not it fit the underlying process. The sequence given to the sub-jects was 2, 4, 6.

Almost all of the subjects quickly concluded the series was "increasing by 2." The actual answer was simply "an increasing series." But under repeated trials, very few subjects tested sequences that went against their original theories.

Taleb observes that "once your mind is inhabited with a certain view of the world, you will tend to only consider
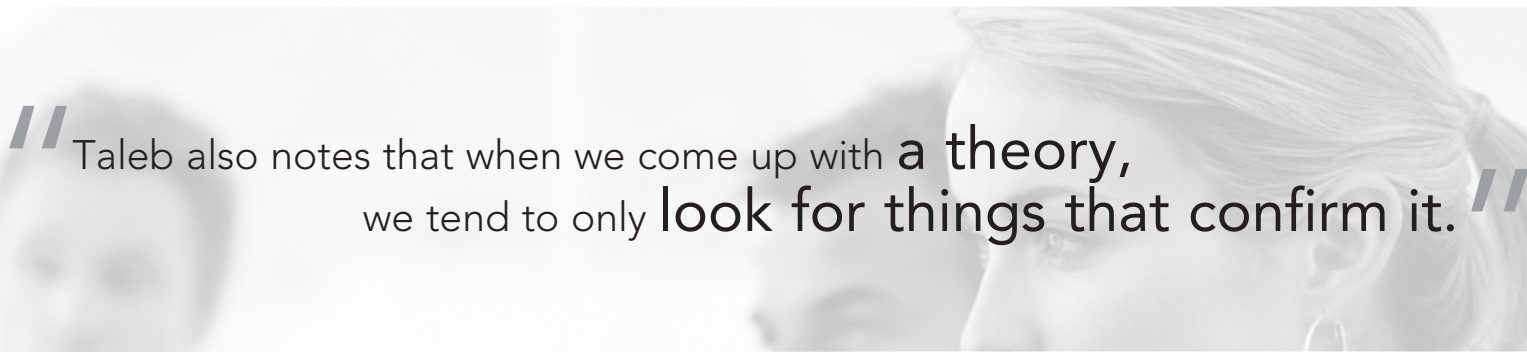
> "Taleb also notes that when we come up with **a theory,** we tend to only **look for things that confirm it.**"

instances proving you to be right." So not only are we quick to come up with theories, we also tend to focus only on evidence that proves those theories.

FINANCIAL MEDIA

Now let's turn to the financial media. Every market day, Yahoo! Finance, one of the world's most used sources of financial information, explains what happened in the day's markets. I picked three consecutive days in April of this year where the S&P 500 index barely moved at all (average market moves would be several times more than the moves on these days). In fact, the cumulative change for these three days was almost flat at about +0.02 percent.

Date	Headline	S&P500
April 2	Stocks Decline as Oil Price Spike Causes Worries About Consumer Spending, Economy	-0.19%
April 3	Stocks Up after Comments From Fed Chairman, Merill CEO Revive Confidence About Credit Markets	+0.13%
April 4	Most Stocks Up After Report of 80,000 Jobs Lost in March; Some Investors Feared Bigger Decline	+0.08%
Cumulative		+0.02%

Note: The average absolute daily S&P500 change over the preceding 12 months was 0.91 percent.

As you can see, even only very slight changes in the S&P 500 index can provoke dramatic headlines. The stretch for meaning in noise seems apparent in the financial media as well.

As an interesting aside, the apparent cause for the April 2 decline in the S&P—the spike in the price of oil—receives no mention in the later headlines. This is surprising given that the price of oil had a very similar spike on April 4 which put the price 2 percent higher than on April 2. I guess that piece of data did not help explain the S&P500 increase on April 4—perhaps that data didn't fit the theory!

To be fair, the dramatic headlines and explanations from the media are also related to the incentives they have. As Taleb states, "the media is paid to get your attention."

COMPLEX SYSTEMS

Another ingredient that complicates arriving at simple explanations in areas such as sports and markets is the complexity of the systems. Complex systems, such as sports and the market, emerge from the interaction of many individual components. In other words, for every outcome, there are a large number of inputs. A key characteristic of complex systems is the linking between cause and effect—that can be very difficult.

Paul Depodesta explains the complexity of a baseball game: "just imagine one at-bat, there is the pitcher, the catcher, the hitter, what pitch will be thrown, and how the fielders are playing." And that doesn't include all of the things leading up to that at-bat such as recent performance.

The markets have orders of magnitude that are much more complex than baseball. However, the financial media are often trying to distill the interactions of millions of participants down to a quick sentence or two.

ARE WE FOOLED BY RANDOMNESS?

Randomness pervades many arenas including sports and markets. Our mind's inherent desire to find patterns or to link cause and effect can fail when it interacts with these types of complex systems. This is not to say that everything is random or to encourage one to be fooled into randomness when it is not there. Instead, it is to point out that our great ability to find meaning can become a rather blunt and misleading tool in certain circumstances. Be wary the next time you read the sports or financial headlines. At least that's my theory, and all of the evidence I'm willing to consider supports it. 💰

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AN ANALYST'S RETROSPECTIVE ON INVESTMENT RISK MANAGEMENT

By James Ramenda

I'm an actuary, but earlier in my career I spent 10 years as a sell-side stock analyst for a broker-dealer performing traditional fundamental research. As an actuary, the tools used by portfolio managers and their results have always interested me, particularly quantitative managers. Although many of the precepts of Enterprise Risk Management can be traced to the investment business, the tools used by actuaries to solve similar problems, e.g., ruin theory, seem to have been well developed for at least as long.

Certainly, quantitatively-based investing has been much in the news lately due to many instances of poor performance in the zig-zag stock market of 2007-2008. These results have called into question prevailing notions of risk management, including the degree of dependence on credit agency ratings, VaR, and other risk measures, which, as one investment bank's SEC filing lamented, "significantly understated the magnitude of actual loss from the unprecedented credit market environment." Specific problems like the discovery of massive fraud at Societe Generale and the rescue of Bear Stearns have added to the sense that the practices employed were not adequate.

In particular, it has been interesting to try to put the recent environment into historical perspective. For example, some commentators (political and financial) state this is the worst crisis since the Great Depression. There have also been statements to the effect that the markets have been impacted by 1-in-1,000-year events. Yet in the broadest economic measures, the recent experience doesn't seem to fit these descriptions. As shown in Table I, the previous great real estate crisis (which gave rise to the RTC in 1989) combined with the first Gulf War, created even worse numbers less than a generation ago. Data from a decade earlier, 1980, shows an even greater stagflation problem.

TABLE I
Economic Comparison

	As of 6/30/08*	As of 12/31/90	As of 12/31/80
Unemployment	5.5%	6.3%	7.2%
Inflation	4.2%	6.1%	12.5%
GDP Growth (Real, YoY)	2.5%	0.7%	0.0%
* Most recently reported. Source: Bloomberg			

This is not to downplay the current crisis, which may still be building, but certainly risk managers can't claim 2007-2008 to be a Black Swan. So why have recent conditions proven so dire for so many investment companies? I don't have any inside knowledge of specific situations in the headlines, but I can see parallels in the past year's financial news and some lessons learned about investment risk from my years dealing with institutional investors.

EVERY PORTFOLIO CORRELATES WITH SOMETHING

Finding a correlation between a portfolio and a market, not necessarily the stock market, means you can begin to evaluate the performance. For example, some managers seek equity returns that are uncorrelated with major indices, such as the S&P 500. To get these returns a manager may go outside the equity markets. An example would be to borrow money to leverage investments in pools of mortgages with the idea of achieving equity-like returns, but uncorrelated with equity indices. Such a manager might rightly claim to be market neutral and that may be borne out relative to the stock market, at least for a

"**Finding a correlation** between a portfolio and a market, means you can begin to **evaluate the performance.**"

period of time. However, that doesn't mean there isn't a strong correlation to something, in this example, the mortgage market. So the manager may tout a low beta and r-squared from the following equation.

$$Return = \alpha + \beta*(S\&P\ 500\ Return)$$

But a different equation might well show a much higher beta and r-squared:

$$Return = \alpha + \beta*(Mortgage\ Index\ Return)$$

Now, the manager may be correct in the usage of market neutral as it is commonly understood, but it could be argued that in this example, the alpha in the second equation contains more information about the manager's skill than the alpha in the first. In particular, it may show the risk actually being undertaken is not being managed efficiently, i.e., there may be better mortgage managers as measured by the parameters of the second equation. Since that's the risk being taken, that's the performance that should be measured. It is important to measure through at least one full cycle of the alternative index to be sure the performance is not a single instance of fortunate timing. Whether this measurement is made exclusive of the general equity market correlation is a question that leads to the next point.

MULTIVARIATE ANALYSIS IS NEEDED

Suppose an equity manager seeks to beat the S&P 500, not by stock-picking in the traditional sense, but rather by picking stocks or sectors that have correlations to other markets. For example, a manager may pick stocks as a play on unexpected weakening in U.S. currency, investing in companies with a heavy mix of foreign

business. These may span many sectors and operating profiles, but if the dollar indeed weakens, the portfolio will probably benefit from positive earnings surprises. In this case, it's very possible there will be statistically significant correlations with both the overall market and currency, perhaps even with foreign markets since that is in essence the type of company the manager is seeking.

$$Return = \alpha + \beta_1*(S\&P\ 500\ Return) + \beta_2*(U.S.\ Dollar\ Index) + \beta_3*(Non\text{-}U.S.\ Global\ Equity\ Market)$$

Currency is used in this discussion, but it could be other sectors, e.g., energy, financials, materials, or more than one sector. Some managers have favorite sectors that they tend to overweight at nearly all times. A multivariate analysis can identify whether they are truly producing alpha or whether their sector was simply in favor in the period measured.

SECOND ORDER EFFECTS CAN BE IMPORTANT

A special case of multivariate analysis is the use of second order effects. An example is including the square of the market index as an independent variable.

$$Return = \alpha + \beta_1* (S\&P\ 500\ Return) + \beta_2* (S\&P\ 500\ Return)^2$$

This equation can identify where a manager's performance is dependent on market extremes, whereas using only first order effects may not provide the same information. A high sensitivity to extremes may indicate unusual risk characteristics, e.g., a high degree of leverage—which leads to the next issue.

WHAT GETS LEVERAGED OFTEN GETS DE-LEVERAGED AT THE WORST TIME

Sharp downturns can create margin calls for leveraged investors, leading them to sell at distressed prices. This is nothing new, but what has made this particularly interesting over the past 20 years is the rise of hedge funds. By definition, hedge fund investors are qualified investors, either wealthy individuals or institutions like pension funds, endowments, insurance companies, etc. Historically, these investors were the patient money that could buy when there was blood in the streets and ride out the down market. But if their money is pooled in a fund and leveraged by a manager, then the situation may reverse. They may find themselves among the sellers in a de-leveraging cycle. Money that traditionally would have backstopped the markets becomes part of the stampede.

CORRELATIONS ARE NOT NECESSARILY CONSTANT IN MAGNITUDE OR DIRECTION

Most recently, high commodity prices are seen as a threat to economic growth. Some of the biggest daily routs in the stock market have been accompanied by jumps in commodities, particularly oil. Yet in various times past, a rise in commodities sometimes coincided with stock market rallies. This type of correlation would be more likely to occur when economic conditions are slow and a pick-up in commodity demand is seen as a favorable development. So in the search for whether a variable is positively or negatively correlated with the market, the answer may be different at different times. The complication this poses is that while a regression analysis may not create a strong overall correlation over time, its residuals may show what is actually occurring is a series of significant but directionally different correlations at different times. Ideally, there would be a variable that could be added to the analysis that would explain the pattern, but in reality the factors involved may be so complicated that a statistically satisfactory solution is all but impossible.

TACTICS MAY NOT FOLLOW STRATEGY

Consider a manager with a well-articulated strategy, i.e., invest at least 80 percent in stocks with blue chip characteristics like large market share, large stock market capitalization, high return on equity, etc. But what happens in the other 20 percent can be important. In particular, if a manager feels that the stated strategy may not be the most likely to perform well a particular time, the 20 percent of holdings outside the strategic sector may be selected specifically to offset the sector. Depending on how the non-strategic 20 percent performs, the manager may look better or worse than their style peers. A variation of this occurs when managers try to force stocks that they like into their core strategy that really don't fit the definition. In either case, a check of large holdings and how much they contribute to overall performance can be interesting.

RISKS MAY NOT BE SYMMETRICAL

A portfolio may behave differently in up markets than in down. If it tracks the market in good times, but collapses in bad, averaging these two results in a single equation does not provide a complete picture. In this case a single regression line would tend to understate the risk posed by a down market. It is increasingly common to see two regression lines used, one in up markets with its own alpha and beta; the other in down markets with its own alpha and beta.

NON-PARAMETRIC METHODS HAVE BROAD APPEAL

Apart from the historical level of risk for a portfolio as measured by traditional metrics, statistics like largest

quarterly gain (loss) and largest quarterly outperformance (underperformance) have been increasing in popularity. These can provide insight into performance in particularly turbulent times, e.g., international crises, natural catastrophes. These measures also place the performance in very straightforward terms that are readily understandable by all observers regardless of their quantitative background. What may be dismissed as an outlier in a scatter chart can provide a wealth of information when put into historical context.

It's striking how many of the exercises and metrics discussed above are well within traditional actuarial training. In fact, sifting through investment performance is very much like sifting through a book of insurance business trying to identify which underwriting class is causing the deviation of actual from expected and why. Certainly, the asymmetrical risk aspect of the insurance business, e.g., taking in many small premiums in exchange for potentially large pay-outs, is analogous to many of the asymmetrical risks inherent in the lending and securitization practices that helped create the current economic distress. The recent economic environment strongly suggests that risk management will be an increasingly important area in the investment industry and there are many needs to be met besides the actual selection of investments.

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QUARTERLY FOCUS
CUSTOMIZING LDI

By Aaron Meder

LIABILITY DRIVEN INVESTING (LDI) IS EMERGING AS BEST PRACTICE FOR CORPORATE PLAN SPONSORS.

L DI approaches have been adopted by an increasing number of institutions. However, LDI solutions have not yet displaced the traditional asset-only approach in most plans due to general confusion about what LDI means exactly and, more importantly, a lack of clarity about how the practice can be tailored to each sponsor's unique situation.

In this article, we aim to make LDI more accessible by providing a simple definition and by showing how plans of different sizes and circumstances may adopt an appropriate LDI approach. To do so, we look at specific sectors of the S&P 500 and find that sectors' varying circumstances lead to significantly different LDI solutions in the areas of return generation, liability hedging and overall risk budgeting.

INTRODUCTION: LIABILITY DRIVEN INVESTING (LDI)

The concept of managing risk and return relative to liabilities is not new. Stated simply, LDI involves taking compensated risks relative to a liability benchmark (a future stream of projected cash flows to plan participants). But LDI is not simply about investing in an LDI benchmark—typically long-duration bonds—but rather understanding the risks being taken relative to the liability, and then taking compensated risks while hedging uncompensated risks.

Moving from the traditional "65/35" (65 percent equities, 35 percent bonds) policy to the more efficient liability-relative frontier involves splitting the portfolio into two components: a liability-hedging component and a return-generation component:

• The allocation to hedging liabilities focuses on hedging risks in the liability that the sponsor does not wish to accept (i.e., interest rate risk and inflation). This component typically consists of long duration, inflation-linked bonds and derivatives.

• The return-generation component seeks to generate consistent returns in excess of the expected liability return (growth in the present value of the liability attributable to the passage of time, equal to the discount rate on the liability, which is about 5 percent to 6 percent in most countries today). Return generation typically consists of well-diversified asset classes with an emphasis on absolute return rather than benchmark-oriented return.

How can this generic LDI framework be applied to construct the right solution for each sponsor's unique situation?

APPLICATIONS OF LDI ACROSS VARIOUS S&P 500 SECTORS

Our research has shown that three key factors—a sponsor's goals and objectives, funded status and time horizon—drive the customization of an LDI solution for individual plan sponsors.

To best illustrate a customized LDI approach, we will use actual, average data for plans within the 10 S&P 500 sectors as an example of how different situations (and sectors) lead to different solutions. While we focus on U.S. corporate plans in this article, the approach is applicable to corporate sponsors in many other countries and some public sector defined benefit plans as well, e.g., Canada and the United Kingdom.

Looking at the key data points in Table 1, we observe the following about the individual S&P 500 sectors with respect to goal, funded status and time horizon:

Table 1
Key LDI data points for S&P 500 sectors as of December 31, 2006

	Time Horizon Factors					
	Liability/ market value	Credit rating	Excess liability growth (service cost/PBO)[1]	Time horizon	Funding ratio	Beta
Telecommunication Services	34.9%	BBB	1.8%	Short	121%	1.0
Consumer Discretionary	34.8%	BBB	1.7%		95%	1.2
Materials	32.5%	BBB	1.9%		93%	1.1
Industrials	28.0%	AA	2.6%	Average	97%	1.0
Utilities	27.6%	A	2.2%		96%	0.8
Information Technology	20.3%	A	2.2%		97%	1.5
Consumer Staples	10.5%	A	2.9%	Long	89%	0.5
Health Care	7.8%	AA	3.9%		88%	0.7
Energy	7.8%	A	2.7%		81%	1.0
Financials	6.6%	A	3.1%		105%	1.1
S&P 500 Sample (n = 360)	**16.7%**	**A**	**2.4%**		**97%**	**1.0**

Source: UBS Investment Bank, UBS Global Asset Management, Bloomberg.
For illustrative purposes only.
[1] Projected Benefit Obligation.

return generation. In addition, funded status affects the tactical and behavioral aspects of hedging liabilities. It should be noted that only two sectors of the 10 S&P 500 sectors are in a surplus position.

Time Horizon: Is the sponsor concerned about the plan's funded status over the next year, five years or 30 years? This is typically a function of the relative size of the plan (pension liability compared to company market value), the health of the sponsor (credit rating) and the maturity of the plan (liability growth). Based on these factors, we have split the S&P 500 sectors into two groups: those likely to have short time horizons, and those with average to long time horizons.

Goals: A sponsor must consider the short- and long-term goals for the plan. A few common examples can help illustrate how companies' goals may differ. One common objective for a frozen plan is to reduce the year-to-year volatility of the surplus, while growing the surplus and funding ratio modestly over time. A plan may target a funding ratio of 100 percent to 120 percent—high enough to reach an annuity buyout level over a specific time frame (in this case, five to 10 years). Meanwhile, a common goal for an ongoing plan—most likely found in sectors with long time horizons—is to achieve a long-term return target while minimizing the volatility of contributions along the way.

Funded Status: A sponsor must consider the plan's current level of assets to meet its future obligations. All else being equal, the greater the value of assets, the less return is needed to meet future obligations. In other words, the plan's funded status drives the need for long-term

Six factors help determine LDI policy

1. Balance between alpha and beta
2. Allocation to alternatives
— Return generation

3. Policy hedge ratio
4. Tactical implementation
— Liability hedging

5. Allocation to return generation
6. Management of risk budget
— Overall risk budgeting

FINDING THE RIGHT LDI APPROACH

We believe there are six key considerations that must be addressed for a sponsor to find the right LDI strategy. These considerations are partially driven by the key factors discussed above, and can be classified under three broader categories:

1. Return Generation Considerations

Balance between market risk (beta) and active risk (alpha): Alpha has the much-desired quality of being uncorrelated with beta. When combined with beta, alpha can reduce overall risk while maintaining or even increasing return expectations. Unlike alpha, beta risk on average will compensate the investor who takes it. There are two factors that cause sponsors to persistently tilt their return-generation component toward either alpha or beta:

• Ability to tolerate equity market volatility: Plans with shorter time horizons have less ability to tolerate equity market risk and to wait for markets to revert after a period of sharp downside deviation. Plans in this situation should consider a higher allocation to alpha to reduce annual volatility of asset returns.

• Link between company's financial health and the health of the overall economy: A company's beta serves as a good indicator. For example, a company with a beta significantly greater than one is very sensitive to economic swings. If such a sponsor has a large allocation to equities, and equity markets fall significantly, the sponsor may be required to make a large contribution at precisely the time when the financial health of the company is in a weakened state.

Allocation to alternatives: Alternative assets, such as real estate, private equity, hedge funds and natural resources offer the investor an opportunity to further diversify sources of return and enhance risk-adjusted performance. But the benefits do not come free, as these asset classes decrease the liquidity of the overall pension fund. Since pension plans have different liquidity needs and time horizons, their allocation to alternatives should be adjusted accordingly. Sponsors with shorter time horizons and greater liquidity needs would typically allocate a smaller amount to alternatives. Likewise, mature pension plans that are paying out large sums in benefit payments should avoid large allocations to alternatives, as their allocation to such assets can rise to an undesirable level.

2. Liability-hedging Considerations

Policy liability hedge ratio: The hedge ratio is the duration of the hedging component—typically domestic investment grade fixed income and derivatives) divided by the duration of the liability, indicating the percentage of the liability being hedged by the hedging component of the overall LDI solution. For example, suppose 50 percent of a plan's assets are allocated to a liability-hedging component with a duration of 20 years and the duration of the liability is 10 years. The hedge ratio for this investment strategy would be 100 percent ((20*0.50) / 10). A hedge ratio of 100 percent implies that the investor assigns no "hedging credit" to the other 50 percent of the portfolio invested in the return-generation component.

But should any hedging credit be assigned to the return-generation component? The answer to this question is primarily a function of the time horizon on which the plan sponsor is focused. Most long-term asset-liability models assume a positive correlation between return generation assets (i.e., equities) and liabilities, which implicitly assigns long-term hedging credit to equities. For sponsors with long time horizons, it may be reasonable to rely on this long-term hedging credit of the return-generation portfolio and therefore desire a hedge ratio of less than 100 percent. For companies in S&P 500 sectors with short time horizons, the focus is more on the short-term relationship between assets and

> " We believe there are **six key considerations that must be addressed** for a sponsor to find **the right LDI strategy.** "

liabilities. In these cases, it is not appropriate to assign a long-term hedging credit to the return-generation component because, over the short term, the correlation (and corresponding hedging credit) between the liability and equities, for example, is unstable and sometimes negative. Therefore, plans with short time horizons should desire a policy hedge ratio of 100 percent.

Tactical implementation of a liability hedge: Whatever the policy hedge ratio, a plan sponsor must decide how it is best implemented. Today, most plans have only a very small hedged position (roughly 10 percent hedged), so it is important to consider how to bridge the very large gap of a position that is 10 percent hedged to one that is, for example, 100 percent hedged. We believe that in many cases a sound plan of layering the hedge over time should be implemented, as opposed to moving to the desired hedge position all at once.
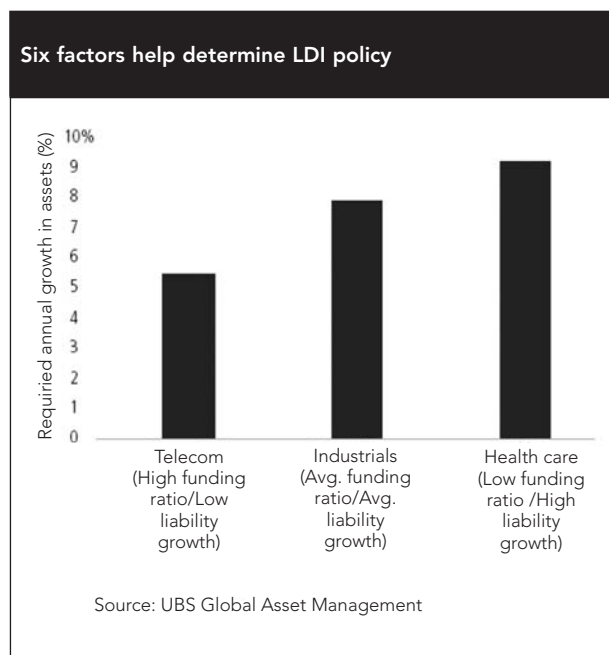
Two factors drive the decision how to implement: the plan's funded status and the plan sponsor's overall interest rate view. If a plan has a funding deficit and the plan sponsor believes interest rates will rise, it will be reluctant to lengthen the duration of assets. Here, the sponsor maintains that rising interest rates will improve the funded status of the plan as the present value of liabilities fall by a greater amount than the assets do. For sponsors in this situation—typical for eight out of the 10 S&P 500 sectors—we would recommend a hedging implementation plan that layers the hedge in stages as the funded status improves and/or interest rates rise over time. However, in cases when the plan has a significant surplus—such as in the telecommunications sector—we recommend protecting the surplus and moving quickly to the desired policy hedge position.

3. Overall Risk Budget Considerations

Allocation to return generation: The plan's current funding ratio and expected liability growth determine the level of required growth in assets needed to meet the plan's obligations over its entire lifetime. All else being equal, the higher the funding ratio, the lower the need for

asset growth. Liability growth refers to how fast liabilities are expected to grow due to the passage of time and the additional benefits earned (service cost). The higher the expected liability growth is, the higher the need for asset growth.

Exhibit 1 provides an illustrative example of the level of long-term growth needed for certain S&P 500 sectors.

Six factors help determine LDI policy

y-axis: Required annual growth in assets (%)

Telecom (High funding ratio/Low liability growth); Industrials (Avg. funding ratio/Avg. liability growth); Health care (Low funding ratio /High liability growth)

Source: UBS Global Asset Management

In this example, the telecommunications sector with its high funding ratio and low expected liability growth needs the lowest amount of growth in assets to meet its obligations. The industrials sector represents a typical required growth of 7.9 percent with its average funding ratio and liability growth. The health care sector is an example of a sponsor with a high need for asset growth long term, approximately 9.2 percent, due to its low funded status and very high liability growth.

Dynamic risk budgeting: As a sponsor's funding ratio, time horizon and goals change, its risk/return needs and preferences can change as well. Assuming no change in a plan's contribution and benefits policies, an increase in its funding ratio would require the plan to generate less return and take less risk. As the time horizon shrinks, the plan will become even more risk averse and demand more return for a given level of risk. Additionally, as the strategic goal of the plan changes, the need for return and risk taking change as well.

For example, freezing a pension plan reduces the need for return, shrinks the time horizon and provides incen- tives to transfer the obligations elsewhere. Overall, we find that sponsors with shorter time horizons and well-defined funding ratio targets reap the most reward from a dynamic approach to managing the overall risk budget.

PUTTING IT ALL TOGETHER: DIFFERENT SITUATIONS LEAD TO DIFFERENT SOLUTIONS

Table 2 summarizes the S&P 500 sectors with respect to the key considerations discussed. It is apparent that the circumstances for the 10 sectors vary significantly and lead to very different solutions, which is a strong indica-

Table 2: Summary of Key considerations for companies in S&P 500 sectors

Sector	Telecom	Consumer discretionary	Materials	Industrials	Utilities	IT	Consumer staples	Health care	Energy	Financials
Return generation										
Balance between active management and market risk	Active tilt	Active tilt	Active tilt	Balanced	Balanced	Active tilt	Market tilt	Market tilt	Market tilt	Market tilt
Allocation to illiquid assets	Low	Low	Low	Average	Average	Average	High	High	High	High
Hedging										
Strategic hedge ratio	100%	100%	100%	<100%	<100%	<100%	<100%	<100%	<100%	<100%
Tactical hedging	Quickly	Staged	Staged	Staged	Staged	Staged	Staged	Staged	Staged	Quickly
Hedging focus	Surplus	Funding ratio	Funding ratio	Funding ratio	Funding ratio	Funding ratio	Funding ratio	Funding ratio	Funding ratio	Surplus
Overall risk budget										
Allocation to return generation	Low	Low	Low	Average	Low	Low	High	High	High	High
Management of risk budget	Dynamic	Dynamic	Dynamic	Less Dynamic	Less Dynamic	Less Dynamic	Least Dynamic	Least Dynamic	Least Dynamic	Least Dynamic

For illustrative purposes only.
Source: UBS Global Asset Management.
The information and recommendations contained herein are a reflection of UBS Global Asset Management's best judgment based on current market assumptions.

tor that there will be no one-size-fits-all LDI solution for plan sponsors.

LDI can thus be described as the recognition of a plan's liability as an efficient benchmark around which risk budgeting should occur. We believe that as LDI is better understood, it will not only continue to gain acceptance, but will be adopted by plan sponsors as best practice. Sponsors will need to break from traditional "65/35" ways of thinking in favor of new approaches. To that end, we believe that a plan equipped with a comprehensive LDI approach, reflective of its specific situation, will provide the best chance for success. ♦

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THE IMPACT OF STOCK PRICE DISTRIBUTIONS ON SELECTING A MODEL TO VALUE SHARE-BASED PAYMENTS UNDER FASB STATEMENT NO. 123 (R)[1]

By Mike Burgess

The issuance of FASB Statement No. 123 (Revised), *Share-Based Payment,* in December 2004 quieted much of the controversy over whether share based payments should be recognized in a company's financial results. It did not specify a model for valuing these payments, however. The model and related assumptions used to value them can significantly affect the amount of costs measured and reported.

A stock's price distribution is a key assumption to any share-based valuation model. Recent research indicates that commonly assumed price distributions may be in error. If the distribution—or density function as it is known to mathematicians—is selected incorrectly, inaccurate or spurious values can be computed.

This article discusses facts and issues related to the selection of a stock's price distribution, including the following:

• Properties of a commonly assumed distribution.
• Empirical evidence regarding price distributions.
• Commonly used models for valuing share-based payments, and the impact of errors in distributions on valuing share-based payments.

First, a brief overview is provided on authoritative and regulatory guidance for model selection and types of assumptions required to value share-based payments.

AUTHORITATIVE AND REGULATORY GUIDANCE
Financial Accounting Standards Board
Aware of the complexity and variety of share-based payments, the Financial Accounting Standards Board (FASB) granted great latitude to the selection of a model for valuing these payments. FASB Statement No. 123

(R) does not require use of a specific model. It simply provides general guidance on this matter. Techniques mentioned in the statement include the Black-Scholes model, lattice or binomial models and Monte Carlo simulation methods, among others. These models are discussed later in this article. Assumptions required depend on the complexity of the plan, but under paragraph A18 of the statement must include, at a minimum, the following:

• The exercise price of the option.
• The expected term of the option, taking into account both the contractual term of the option and the effects of employees' expected exercise and post-vesting employment termination behavior.
• The current price of the underlying share.
• The expected volatility of the price of the underlying share for the expected term of the option.
• The expected dividends on the underlying share for the expected term of the option.
• The risk-free interest rate(s) for the expected term of the option.

The exercise price is simply the price at which the option can be transacted. If the exercise price for an option to purchase stock is above the current stock price, the option is out-of-the-money. If the reverse is true, the option is in-the-money.

The volatility of a stock is the amount by which its price is expected to fluctuate in a period of time. Volatility is generally measured as the annual standard deviation of the stock's daily price changes.

Although a stock's price distribution is not included in the list of required assumptions, it is inextricably linked to a model's design and assumptions about a stock's volatility. In fact, the Black-Scholes model explicitly

[1] All data referred to herein is courtesy of *Options as a Strategic Investment* by Lawrence G. McMillan, Wiley Trading.

> *In the* SAB, *the staff indicated it would* not object to *a company's* choice of a model *if the* model *meets the fair value measurement objective.*

assumes a lognormal *distribution of prices.* This distribution is discussed in more detail below.

Assumptions about price distribution impact our perception of volatility. Smooth transitions from one price level to another are often associated with a normal distribution of prices, and a stable volatility percentage. Erratic price moves may indicate an uneven price distribution and a volatility percentage, where average volatility is a poor predictor of expected volatility.

United States Securities and Exchange Commission
The United States Securities and Exchange Commission (SEC) generally deferred to the FASB's guidance on the selection of models and assumptions for valuing share-based payments. SEC Staff Accounting Bulletin No. 107 (SAB No. 107) allows the use of the Black-Scholes model, lattice or binomial models and Monte Carlo simulation methods, among others. The SAB specifies three requirements for any valuation model used. The model should:

• Be applied in a manner consistent with the fair value measurement objective and other requirements of Statement 123R.
• Be based on established principles of financial economic theory and generally applied in that field.
• Reflect all substantive characteristics of the instrument.

In valuing a particular instrument, certain models may meet the first and second criteria but may not meet the third criterion because the techniques or models are not designed to reflect certain characteristics contained in the instrument. For example, for an option in which the exercise is conditional on a specific increase in the price of the underlying shares, the Black-Scholes closed-form model would not generally be appropriate. While it meets the first and second criteria, it is not designed to consider conditional market prices.

In the SAB, the staff indicated it would not object to a company's choice of a model if the model meets the fair value measurement objective. For example, a company is not required to use a lattice model simply because it is more complex than other models. However, the SAB contains many examples of situations in which lattice or other non closed-form models may be required to solve valuation issues. Some professionals have interpreted this as an implicit preference for these more complex techniques.

A COMMONLY ASSUMED DISTRIBUTION
Many market analysts and economic valuation professionals use the *lognormal distribution* as a proxy for the actual distribution of stock prices. The distribution is basically a bell curve skewed to the right. This skew is explained by the fact that stock prices cannot be below zero. In short, the distribution indicates that stock prices can never be less than zero, can rise to very high values and usually drift up and down.

The lognormal distribution is based on the historical volatility of a stock's price. This volatility is measured by the standard deviation in the stock's price, and would predict that a stock's price would remain within three standard deviations of its current price approximately 99 percent of the time.

The lognormal distribution is similar to the bell curve studied in basic statistics, and is therefore a comfortable concept for most users. It is a very rough approximation to the way stock prices behave *most of the time*. The lognormal distribution may be intuitively appealing, but it simply does not accurately describe the way stock prices behave. We have all been struck by how a stock that "just can't rise anymore" marches ever higher in price, and a quality stock that "can't go any lower" continues to plummet.

The ease with which descriptive statistics may be computed for this distribution, users' familiarity with it and its general intuitive appeal may explain why this distribution is so commonly used to value share-based payments. This distribution may be useful for many purposes, but its application to valuing share-based payments is suspect.

EMPIRICAL EVIDENCE REGARDING STOCK PRICE DISTRIBUTIONS

Actual market prices routinely rise or fall more than three standard deviations. Some prices change as much as eight standard deviations. The lognormal distribution would predict these moves to be extremely rare. In fact, these moves are not rare at all.

The following table lists price changes for selected stocks on April 5, 1999, a volatile but not abnormal day:

Stock	Last Sale	Change	Standard Deviations
Aspect Devt (ASDV)	$ 8.00	$ -14.38	- 31.2
Axent (ANT)	8.00	-12.00	- 11.2
Ameritrade (AMTD)	91.63	29.00	8.6
CheckPoint (CHKP)	28.75	-10.75	- 8.4
Sabre Gp (TSG)	55.00	8.50	8.0

The lognormal distribution would indicate that the probability of eight standard deviation moves would be 0.000000000000000629, or once in many billions of events. No, this is not a typographical error. It is graphic empirical evidence of the way stock prices behave. Other substantial moves occurred that day. In fact, 58 stocks had price changes of over four standard deviations on that day.

Many periods have been studied to determine the frequency of these asymmetrical changes.

For a 30-day period beginning on Oct, 22, 1999, price changes on 2,888 optionable stocks were computed. The following table lists the number of stocks which moved by the respective number of standard deviations (σ). σ is the Greek letter sigma which mathematicians often use to indicate standard deviations.

10/22/99–12/7/99:					
Price Movements					
	3σ	4σ	5σ	> 6σ	Total
Up Moves	309	116	44	47	516
Down Moves	69	29	15	19	132

A period of low stock market volatility was also studied (July 1993). Fewer optionable stocks existed during this period, and only 588 stocks were examined. This is a smaller, but statistically valid sample.

7/1/93–8/17/93:					
Price Movements					
	3σ	4σ	5σ	> 6σ	Total
Up Moves	14	5	1	1	21
Down Moves	28	5	3	4	40

In these and other confirming studies, the results indicate the frequency of price moves far exceeds a nearly zero percent probability the lognormal distribution would predict. Some studies have indicated a 4σ move is as much as 20 times more likely than would be expected if prices were normally distributed. The stocks sampled were not low-price, obscure penny stocks priced at $1 per share; they are highly recognized companies. The lognormal distribution is simply a poor predictor of the frequency and magnitude of large price changes, and these studies confirm this point.

COMMONLY USED MODELS FOR VALUING SHARE-BASED PAYMENTS

Typically, investors use one of three types of models to value stock options: the Black-Scholes model, Binomial or Lattice models and Monte Carlo models. Economic Valuation experts also use these models to value share-based payments. The implications of the stock price distributions on which their computations are based for valuing share-based payments are discussed below

The Black-Scholes Model

The Black-Scholes model is a closed-form model for valuing an option. The model is characterized as "closed" because a user cannot adjust the paths followed by a stock's price for known aberrations or trends. The technique assumes stock prices are lognormally distributed. Subject to a user's selection of input parameters, the underlying algorithm for computing option values is fixed. (The required parameters are those listed above under the *Financial Accounting Standards Board section*). If price paths cannot be introduced into the computations, the model may significantly over or understate an option's value. As indicated in the previous section, the likelihood of price trends or asymmetric changes in price is far higher than the lognormal distribution would predict.

If the fair values used to record compensation cost are over or understated, then compensation cost is also over or understated. As indicated in the previous section, the major distortions in probabilities occur in the "tails" of the distribution. Outlying prices are the points at which mildly to deeply "out-of-the-money" options become profitable. These types of options are often associated with cash constrained, growth-oriented industries, start-ups and corporate spin-offs. Such companies liberally issue "out-of-the-money" executive stock options to conserve cash, and attract talent with the potential for out-sized rewards. These companies are also very sensitive to small changes in reported earnings. As a result, it may not be advisable to use the Black-Scholes model to value "out-of-the-money" options issued by these companies.

Binomial or Lattice Models

Binomial or lattice models are simply decision trees, and may be used to value options. A user sets a point of origin, and then specifies events and subsequent events that may occur. The origin is typically the stock's price on the day of analysis—for options used as investments—or the grant date when valuing a share-based award. Each event explicitly includes a potential outcome in the model, and is assigned a probability of occurrence. Option values are determined at the terminal points of the tree based on these events, and the expected payoffs of the stock price paths followed.

Binomial or lattice models are not constrained to use a particular stock price distribution. They can be as simple or complex as the price history, development time and financial resources available to develop them. In the right situations, this added complexity can result in better estimates of option prices. However, These models require extensive history to develop and are expensive to create. Although these models can be designed to account for an array of stock price distributions, the expense and data requirements to develop them may make their use prohibitive for smaller public companies with a shorter trading history. However, they may be suitable for larger companies as a means to account for their actual stock price distributions.

Monte Carlo Models

The Monte Carlo approach is a simulation method. Basically, the user defines an event or outcome that he is trying to simulate and the related assumptions, and inputs these to a software program. The program completes thousands or perhaps millions of "trials" based on this information, and reports the resulting distribution of results. From this resulting distribution, the expected outcome is measured.

This method has several advantages:

• An array of parameters can be used, including empirical stock price distributions. As a result, issues related to extreme price moves can be explicitly addressed in valuing an option or other share-based payment.

• Software packages exist to perform these simulations. This minimizes design and programming expenses.

• The "trial" process can mitigate the impact of a short or incomplete data history (e.g., for a company with a brief trading history).

In *Options as a Strategic Investment,* noted options expert Lawrence McMillan reports that Monte Carlo studies completed using empirical stock price distributions have yielded startling results. In short, buying options is much more profitable than conventional wisdom would predict. Conventional wisdom assumes a lognormal distribution of prices, and asserts that buying options is rarely profitable.

An executive receiving a slightly or deeply "out-of-the-money" option is in an analogous position to the option buyer. He is trading his services as payment for the chance that options granted to him will become profitable. Analogizing the Monte Carlo studies to the valuation of share-based payments suggests that failure to explicitly include empirical distributions in a model results in assigning lower fair values to share-based payments. As a result, compensation expense would also be lower.

Application of the Monte Carlo method can neatly sidestep many of these issues, and perhaps result in the assignment of more realistic values for share-based payments.

CONCLUSION

The decision to value share-based payments and include them in financial results is settled. The choice of methods to value them is not. The FASB and SEC deferred to professional judgment in the selection and application of these methods.

Recent studies regarding stock price distributions indicate the probability of large price moves may be much higher than conventional models would predict. As a result, the Black-Scholes model may underestimate the payoff associated with "out-of-the-money" options, and the related compensation expense. Binomial or lattice models and Monte Carlo methods provide a means to address this problem. In consideration of the time and expense required, Monte Carlo methods may offer the best combination of computational accuracy and simplicity. ♎

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SEISMIC SHIFTS IN PENSION INVESTMENTS SPELL OPPORTUNITIES FOR U.S. LIFE INSURERS

By Victor Modugno

The Pension Protection Act of 2006 (PPA)—which will be phased into effect between 2008 and 2011—will result in higher and more volatile required cash contributions for most U.S. private sector defined benefit pension plans (DB plans}. SFAS 158 will revise U.S. GAAP accounting for these plans to place net projected pension obligations on the balance sheet starting at the end of 2006. The next phase of the Financial Accounting Standards Board (FASB)'s pension project is likely to use market value of pension assets and liabilities and result in even greater volatility in earnings.[1]

This will result in a paradigm shift in DB plan assets from equities to long-term bonds, alternative investments and insured products—very similar to what happened in the United Kingdom following similar reforms. A McKinsey study projected that frozen and terminated DB plans will increase from 25 percent up to 75 percent of total plan assets over the next five years, while terminated DB plans will increase from under 5 percent up to 20 percent.[2] Lump sums have become a common form of settlement for terminating DB plans. When offered a lump sum, 88 percent of participants take it.[3] Lump sums are also popular with employers, since they generally cost less than annuities. Since the plan's early retirement factors are fixed, lower interest rates should lessen the cost of the plan's early retirement, which is not factored into the lump sum, but must be included in the annuity. Some employers do not offer the lump sum option, perhaps because most recipients spend these funds instead of rolling them over into to retirement accounts.[4] If only 10 percent of $360 billion increase in terminating plans' assets over the next five years is used to purchase annuities, it would more than triple the current $2 billion a year in annuity buy-out premiums. This is consistent with the EBRI/Mercer survey that shows those planning to terminate in the next two years are more than triple those terminating in the last two years.[5]

The approaching tsunami in DB plans discontinuance and termination has attracted the interest of new providers such as investment banks and other funds.[6] However, distributions needed to effect a termination in the United States will be limited to lump sums or annuity purchases. The safest annuity rule will limit annuity purchases to highly rated life insurers.[7] These new providers will have to content themselves to managing assets and providing products to reduce earnings and cash flow volatility for DB plans prior to termination. In some cases, the frozen plan could be transferred to another corporation. It has been suggested by some of these new providers that the PBGC would not object to the sale of a frozen DB plan to a corporation with higher credit ratings. ERISA imposes only broad fiduciary standards—it allows A/L mismatch and high-risk investments. The prudent investor rule looks to what other pension plans are doing in determining pru-

1   Modugno, V., "The Impact of Reversion Taxes on Pension Plan Funding," pp. 9-11, includes a detailed discussion of the effects
    PPA and FASB on defined benefit plans http://www.soa.org/research/pension/research-the-impact-of-reversion-taxes-on-pension-plan-funding.aspx

2   McKinsey & Company, "The Coming Shakeout in the Defined Benefit Market" p.7
    http://www.mckinsey.com/clientservice/financialservices/pdf/coming_shakeout_in_defined_benefit_market.pdf

3   Watson Wyatt, "Choosey Employees Choose Lump Sums!" The Insider, April 2001
    http://www.watsonwyatt.com/us/pubs/insider/showarticle.asp?ArticleID=7249

4   Working Group On Retirement Plan Leakage, U.S. Dept of Labor, Advisory Council On Employee Welfare And Pension Benefits, "Are We Cashing
    Out Our Future?" http://www.dol.gov/dol/pwba/public/adcoun/leaknew1.htm

5   EBRI Issue Brief No. 307 (July, 2007) p.7 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1002643

6   Woolner, Aaron, "Playing Catch Up", Life & Pensions December, 2007 p 32 http://www.life-pensions.com/

7   U.S. Department of Labor, "Interpretive Bulletin 95-1" 29CFR2509.95-1 (1995)
    http://www.dol.gov/dol/allcfr/Title_29/Part_2509/29CFR2509.95-1.htm

There are at least 10 large insurers
competing for **annuity closeouts.**

dence. So the acquiring corporations can run these pension funds like hedge funds benchmarked to the liability index. They can quote a lower price than a lump sum/annuity buyout termination.

This approach has several problems beyond the possibility of PBGC lawsuit. All of the accounting, funding, reporting, fiduciary requirements and PBGC premiums for an ongoing plan continue to apply. If the arrangement blows up, the DOL is likely to go after the original fiduciaries that sold the plan, in addition to the new ones actually responsible for benefit losses. Moving the assets to a higher rated, better-capitalized company doesn't make economic sense. It would be more capital efficient to manage the assets at the original company. The sponsors of these new arrangements appear to be underestimating the underwriting risks in guaranteeing annuity benefits. Perhaps they believe that mortality losses from using the minimal required mortality will not appear until the distant future, and so they can under price longevity risk. Early retirement and forms of benefit losses can appear quickly, before the sponsors of these new arrangements can extract their funds.

The reasons that DB plan sponsors freeze rather than terminate their plans include:

1) They do not view annuity rates as attractive. This misconception is driven by use of assumed returns on equities and extremely aggressive demographic assumptions in the valuation of ongoing plans. New accounting and funding rules should reduce the assumed returns to corporate bonds. This still leaves the issue of default and cash flow risk in corporate bonds and the demographic

assumptions. There are at least 10 large insurers competing for annuity closeouts. So the low bid from these safe annuity providers reflect the fair market value of these benefits. It is not high because of state regulatory investment, reserve and capital requirements. The capital costs and investment strategies are driven by the rating agencies' requirements for a double A rating. For example, the rating agency requirements to set up a triple A structured company to issue GICs results in capital requirements and investment restrictions that are less favorable than those for an insurer and this would be even more true with additional underwriting risks in annuities, if such a company could be set up. The capital requirements would be slightly less for an AA company.

2) The DB plan is under funded and cannot afford to terminate. PPA should eventually lead to full funding if the company does not qualify for distress termination (i.e., bankruptcy).

3) The DB plan is over funded and does not want to pay reversion tax. This is usually solved by conversion to cash balance plan, where the excess assets can fund future defined contribution benefits. Indeed, in most plan freezes, the employer funds future retirement benefits through defined contribution arrangements.[8] Once the over funding is used up, the cash balance plan can be terminated in favor of a 401k plan.

While it is theoretically possible to continue a frozen plan until the last annuitant has died, most DB plan freezes are a way station to eventual plan termination.

[8] EBRI, Op. Cit., pp. 17-19
[9] McKinsey & Company, Op. Cit., p. 19 ff.

For U.S. insurers who qualify as safe providers, the annuity buyout market presents the greatest opportunity due to the limited competition. The previously cited McKinsey study discusses the coming battle between insurers, investment banks, and asset managers for DB plan assets under this shift in investment strategy.[9] While investment banks tend to be innovative and aggressive at going after profitable business, insurers have special expertise in long-term fixed income assets and liabilities and risk management of annuities that should help them compete for frozen and ongoing plans that will be more focused on accounting and funding risk than on expected equity returns. ◊

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SESSION 65	Tuesday, October 21	10:30 a.m. – Noon

A Look into the Future – Economic Forecasts for 2009

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With a volatile year nearly in the books, actuaries are beginning to turn their eyes to 2009. Join this session as several actuaries and economists discuss of what lies ahead.

SESSION 83	Tuesday, October 21	2:30 – 4:00 p.m.

The Mortgage Crisis: Were Insurance Companies and Pension Plans Prepared?

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Much has been written about the mortgage crisis—and the credit crunch more generally—during the past year. This session will critically analyze the state of affairs from two perspectives: 1) life insurers/pension plans that hold collateralized securities in their portfolio and 2) monoline insurers and financial guarantors that insure these securities.

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