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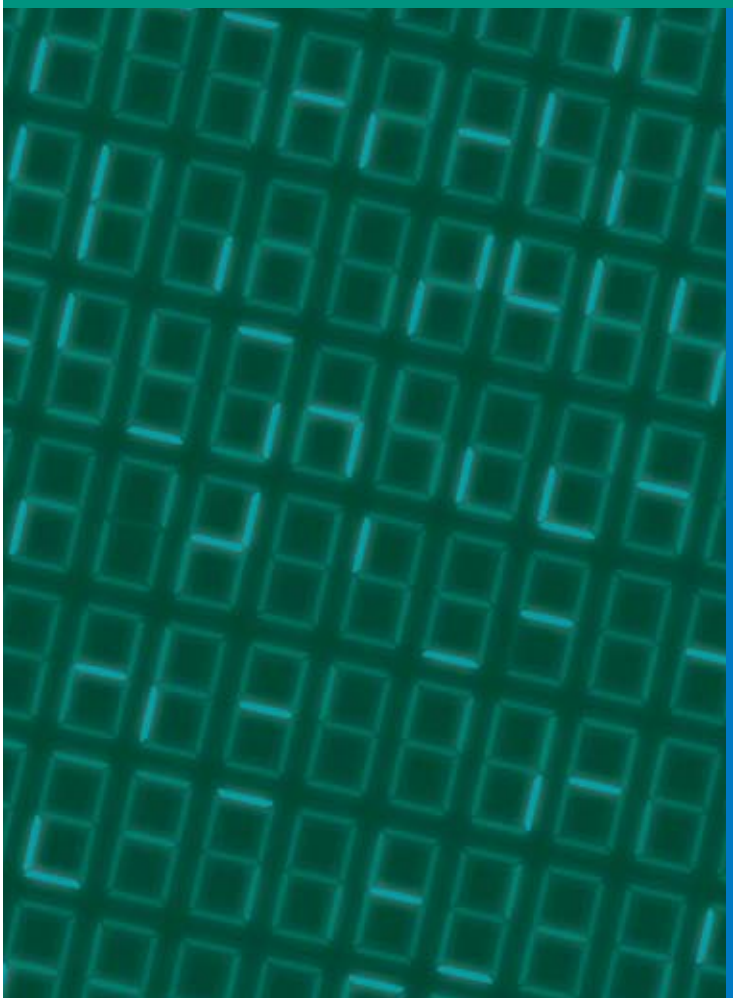


Liability Driven Investing: Challenges and Opportunities

INTRODUCTION

Fretting over the free and easy ways of government fiscal policy, the late Sen. Everett Dirksen of Illinois once said, "A billion here, a billion there – pretty soon it adds up to real money." This is still true. Take the case of the New Jersey public pension system. A billion to this non-pension use, a billion to that non-pension use – pretty soon the pension system is seriously underfunded. According to New Jersey newspaper, *The Record* (April 9, 2007), the New Jersey public pension system is underfunded to the tune of almost $33 billion – by any standard, real money.

Unfortunately, the New Jersey situation is not an isolated case. Numerous pension plans face serious challenges with regard to funding adequacy. The scope of the matter has led to several regulatory changes concerning how pensions account for and value their assets and liabilities. These changes have highlighted the flaws of traditional asset management and pushed plans towards liability driven investing.

Fortunately, plan sponsors should find the challenges of dealing with the overall funding situation and the effects of the regulatory changes more manageable than it might first appear. The availability of such investment management tools as CBOT 30-Year Interest Rate Swap futures can be a key factor in devising responses that are both prudent and cost-effective.

A REGULATORY OVERVIEW

The Financial Accounting Standards Board (FASB) and the regulatory agencies responsible for overseeing the safety of public and private pension funds are bringing forward a number of regulatory changes. In simple terms, there are two changes of immediate concern:

- Mark-to-market accounting of assets and liabilities at regular intervals.

- Discounting liabilities to present value with the use of a corporate yield curve rather than a smoothed interest rate.

Other changes deal primarily with how those with funding deficits can catch up.

Marking-to-market at regular intervals will increase the transparency of critical funding ratios, but it may also lead to considerable financial statement volatility because it will highlight the mismatch in interest rate sensitivity between plan assets and plan liabilities.

Indeed, these accounting changes could create major challenges even for plans that have been doing everything right in conventional terms. Traditionally, plans have invested in a mix of 60 percent stocks and 40 percent bonds to fund their liabilities. Plan administrators have evaluated the performance of each asset segment against benchmarks such as the S&P 500 Index for stocks and the Lehman Brothers U.S. Aggregate Index for bonds. Success has always been defined in relation to these benchmarks.

The trouble with this approach is that the chosen performance gauge fails to explain the whole picture. The ultimate goal of a pension plan is to fund liabilities, and a plan that consistently outperforms traditional return benchmarks can still fall far short of this ultimate goal. Consider, for example, a plan that benchmarks its fixed-income allocation to the Lehman Brothers U.S. Aggregate Index. The measure of price sensitivity to yield change in the fixed-income arena is modified duration (also called dollar duration). Given the typical composition of the bond portfolio implied by the Lehman Brothers U.S. Aggregate Index, the fund can expect this performance benchmark to respond to market yield changes in approximately the same way as a 5-year bond. To make this concrete, consider a $1 billion position in a 5-year bond that has a 4.85-year modified duration. This means that a one basis point yield change will result in a $485,000 change in the value of this asset.

Unfortunately, this choice of performance gauge may be inappropriate, given the needs of the fund. A typical pension plan, with liabilities stretching out as far as the eye can see, has a modified duration that is more likely to run in the neighborhood of 15 years – roughly three times longer than the modified duration exposure of the benchmark. That is, a one basis point yield change will result in a $1.5 million change in value for $1 billion worth of liabilities.

In short, the mismatch between the fund's objectives and its choice of performance measure may have serious consequences. Specifically, even though the plan may consistently outperform standard return-on-asset benchmarks, it might still fail to meet its goal of funding its liabilities.

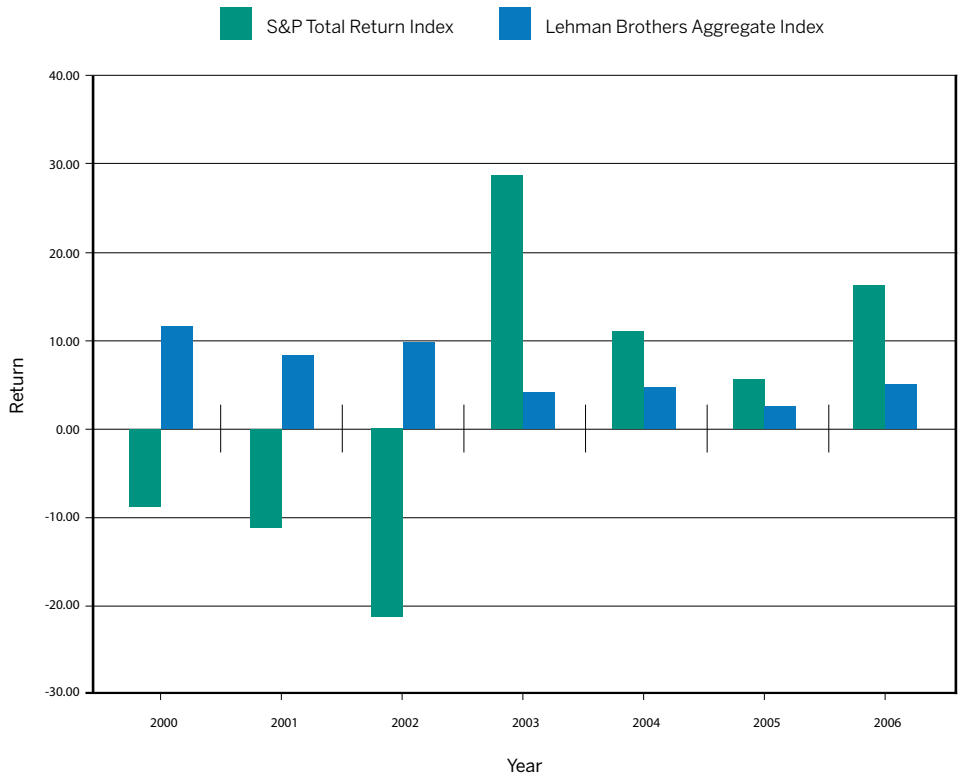
WHEN YOU COME TO A FORK IN THE ROAD, TAKE IT

Plan sponsors must strike a balance between safely funding liabilities, minimizing future plan contributions and reducing financial statement volatility.

One alternative is to stick with the same traditional mix of stocks and bonds as they have always done. Although this provides strong historical returns, given the regulatory changes sketched out above, it may expose the plan to unwanted financial statement volatility and may require irregular contributions.

To illustrate, consider a traditional 60 percent stock and 40 percent bond asset allocation, without rebalancing and with a constant liability duration of 15 years, marked-to-market using the swap curve. The stock portfolio tracks the S&P 500 Total Return Index (SPTR) and the bond portfolio tracks the Lehman Brothers U.S. Aggregate Index (LBA). Exhibit 1 shows the year-to-year percent change in the value of each index from 2000 through 2006.

EXHIBIT 1: EQUITY AND FIXED-INCOME ANNUAL RATES OF RETURN



Suppose the value of the assets at the start of 2000 matched the $1 billion present value of the 15-year liability. During 2000, the SPTR lost 9.1 percent while the LBA gained 11.63 percent. As a result, the asset total at the start of 2001 would have been $992 million. This amounts to an $8 million loss on the asset side. However, the 30-year swap rate, which is used to represent a 15-year duration in this example, dropped from 7.330 to 6.315, creating a new liability value of $1,159 million. Since liabilities can be viewed the same as a short-bond position, this amounts to a $159 million loss. Thus, the plan that began 2000 fully funded, began 2001 only 86 percent funded.

Exhibit 2 repeats this arithmetic for each year. The "Surplus/Deficit" column shows this fund to have been in deficit at every reporting point after the beginning of 2000. The "Funding Ratio" column shows in percentage terms how close this fund was to being fully funded. These values are striking – but not uncommon.

EXHIBIT 2: HYPOTHETICAL PERFORMANCE OF PLAN WITH TRADITIONAL ASSET ALLOCATION

Year	Total Assets ($ million)	Total Liabilities ($ million)	Surplus/Deficit ($ million)	Funding Ratio (percent)
2000	1,000	1,000	0	100
2001	992	1,159	-167	86
2002	965	1,180	-215	82
2003	908	1,376	-468	66
2004	1,038	1,326	-288	78
2005	1,114	1,357	-243	82
2006	1,154	1,389	-235	83
2007	1,129	1,340	-211	84

One alternative is to use a portfolio of long-dated bonds benchmarked against the 30-year swap rate as a means of aligning the interest rate sensitivity of plan assets and plan liabilities. This will do much to control financial statement volatility. The drawback of this approach is that it fails to minimize future contributions. Moreover, historically it has underperformed a traditional allocation because it lacks the risk premium associated with equity.

Exhibit 3 shows what could have happened if the plan managers had targeted the liabilities and matched the durations of the assets to those of the liabilities. This results in almost no balance sheet volatility, but neither of these assets generate any significant funding surplus.

EXHIBIT 3: HYPOTHETICAL PERFORMANCE OF PLAN WITH LONG-DATED BOND ALLOCATION

Year	Total Assets ($ million)	Total Liabilities ($ million)	Surplus/Deficit ($ million)	Funding Ratio (percent)
2000	1,000	1,000	0	1.00
2001	1,159	1,159	0	1.00
2002	1,180	1,180	0	1.00
2003	1,376	1,376	0	1.00
2004	1,326	1,326	0	1.00
2005	1,357	1,357	0	1.00
2006	1,389	1,389	0	1.00
2007	1,340	1,340	0	1.00

THE RIGHT FORK — A SWAP FUTURES SOLUTION

Clearly, any prudent plan sponsor wants an efficient portfolio that maximizes returns for any given level of risk. While the 2000-2002 time period was not the stock market's finest hour, stocks have historically outperformed bonds over the long haul and a 60-40 asset allocation is what many constitute as a productive use of capital.

Equally as clear, no prudent sponsor wants the financial statement volatility that this allocation can create in the new regulatory environment. On the other hand, while a long-dated portfolio minimizes balance sheet volatility, its returns are not attractive.

An elegant solution to this dilemma involves the traditional asset allocation – whether 60-40 or some other mix – plus an overlay of CBOT Interest Rate Swap futures to neutralize the volatility of the liabilities. Swap futures appear to be the ideal investment management tool for two reasons. First, the modified duration of the 30-Year Swap futures contract is similar to that of a 15-year pension liability. Second, these futures respond to swap rates that are at least very similar to the rates used to discount liabilities to present value. Such a futures overlay will allow the assets to do their work and reduce the mismatch in interest rate sensitivity of plan assets and plan liabilities.

To see how this can work, consider the hypothetical plan of Exhibit 2 with its 15-year liability and its traditional allocation of stocks and bonds and assume that CBOT 30-Year Interest Rate Swap futures were available during the period from 2000 on.

The goal of the overlay portfolio is to immunize the interest rate of the plan liabilities. As previously discussed, a one basis point change in yields creates a $1.5 million change in the value of liabilities. Using the rates table found on the CME Group Web site and the 7.33 30-year swap in 2000, the DVO1 of a single 30-year swap contract is $104.85. Given these values, it would have taken approximately 14,300 futures contracts ($1,500,000/104.85) to accomplish this goal.

The "Cumulative Overlay" column of Exhibit 4 shows how an overlay strategy using CBOT 30-Year Interest Rate Swap futures could have performed during this seven-year period. Note not only the better returns but the reduced volatility. This contrasts sharply with the Exhibit 2 plan that shows deficits every year. Further, even in the two deficit years, the funding ratios of the plan using the overlay are far healthier than the ratios of the Exhibit 2 plan in those years.

Cost is always a factor in contemplating new approaches. At the current initial margin of $2,700*, the cost of hedging liabilities with CBOT 30-Year Interest Rate Swap futures will be $270,000 for every $10 million in liabilities (or $2.7 million for every $100 million in liabilities), not including transaction costs. Of course, market participants can use Treasury securities to post these margins and the interest payments on these securities will continue to accrue to the pension plan. Immunizing the interest rate sensitivity of plan liabilities with $2.7 million in margin securities appears vastly preferable than allocating $100 million in assets to a long-dated bond portfolio.

*As of April 9, 2008. Margins are subject to change, so please visit www.cmegroup.com/margins for most current margin information.

EXHIBIT 4: HOW A SWAP FUTURES OVERLAY CAN IMPROVE PLAN PERFORMANCE

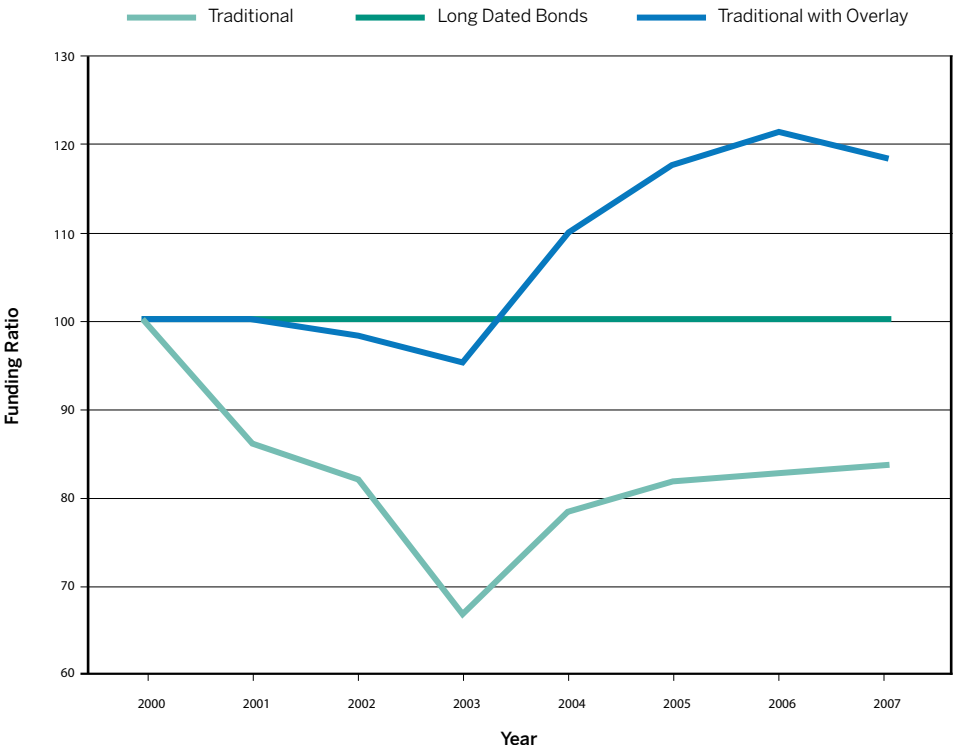
Year	Total Assets ($ million)	Overlay Return ($ million)	Cumulative Overlay ($ million)	Assets + Overlay ($ million)	Total Liabilities ($ million)	Surplus/ Deficit ($ million)	Funding Ratio (percent)
2000	1,000			1,000	1,000	0	100
2001	992	169	169	1,161	1,159	2	100
2002	965	23	187	1,152	1,180	-28	98
2003	908	225	401	1,309	1,376	-67	95
2004	1 ,038	-58	401	1,439	1,326	113	109
2005	1,114	37	467	1,581	1,357	224	117
2006	1,154	38	522	1,676	1,389	287	121
2007	1,129	-57	454	1,583	1,340	243	118

THE BOTTOM LINE

In actual practice, any pension plan has an array of liabilities falling due at intervals all along the yield curve. Also, investment managers will rebalance at regular intervals to maintain the desired asset balance and futures overlay managers will adjust and roll positions forward at least quarterly. In sum, the actual practice is far more complex than this example.

Nevertheless, the principles discussed here hold true in any case. As Exhibit 5 illustrates, by using investment management tools such as CBOT 30-Year Interest Rate Swap futures, plan managers can devise overlay portfolios that both reduce the interest rate mismatch of plan assets and plan liabilities, and allow plan sponsors to maintain efficient asset allocations.

EXHIBIT 5: FUNDING LEVEL COMPARISON



Futures trading is not suitable for all investors, and involves the risk of loss. Futures are a leveraged investment, and because only a percentage of a contract's value is required to trade, it is possible to lose more than the amount of money deposited for a futures position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles. And only a portion of those funds should be devoted to any one trade because they cannot expect to profit on every trade.

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