



SOCIETY OF ACTUARIES

Article from:

Pension Section News

September 2006 – Issue No. 62

The Risk of Declining Market Cap with Large Pension Obligations

by Raymond Murphy

Upcoming funding and accounting regulations will limit the ability of pension plan sponsors to smooth the recognition of investment gains and losses, resulting in better transparency, but more volatility. More cost volatility will make short-term budgets harder to manage, and large healthy companies will need to find a way to either bear or mitigate the risk. Companies that have experienced a decline in market capitalization, but still retain large pension obligations, will not be as able to withstand the cost of a sharp decline in funded status.

This article will focus on the pension risk from the standpoint of different companies. Specifically, we'll examine risk based on the relative size of the pension obligation to the market capitalization of the plan sponsor.

Individual Analogy

Before we address the financial risks of pension plans, let's consider two gamblers on their way to Las Vegas. Gamblers A and B both like to play black jack and both will wager \$1,000 with the understanding that they could lose it all. However, Gambler A has a net worth of \$1,000,000 compared to B's net worth of \$5,000.

If Gambler A loses it all, it will not change his lifestyle or credit rating. Gambler B stands to lose 20 percent of his net worth, which would materially affect his financial health.

Obviously, the \$1,000 wager has different meaning to A and B. Think of the \$1,000 wager as the potential loss to a pension fund. If Gambler A loses \$1,000, he can easily replace the loss from other sources. Similarly, a company should be able to withstand a loss in pension surplus of 1/1000th of its market cap without affecting its operations or its credit rating.

Gambler B is in deep trouble if he loses the \$1,000. If a company experienced a pension loss equal to 20 percent of its net worth, this would have serious consequences to earnings, cash flow and credit rating.

Measuring Pension Risk

Actuarial losses can arise from several sources (e.g. turnover, salary increases, longevity, etc.), but for this purpose we'll discuss only investment losses and discount rate

changes. These changes are typically measured annually, but to keep the analysis simple, let's assume that the change occurs instantaneously.

Assuming a normal distribution, the investment gain or loss will be within two standard deviations of the mean return 95 percent of the time. The standard deviation of equity returns and long-term government bond returns are about 20 percent and 9 percent respectively. The variance of a pension plan's returns will depend on its asset allocation. A pension trust with 65 percent equities and 35 percent long government bonds would have a standard deviation of about 16 percent, which would imply a range around the expected return from plus 32 percent to minus 32 percent.

The liability change is driven by changes in the discount rate. From January 1986 through January 2006, the mean change in the Moody's Corporate AA yield was -.25 percent with a standard deviation of .80 percent. The two standard deviation rule implies that discount rates will generally vary plus or minus 1.6 percent.

Pension cash flows have long durations and long duration liabilities will react more to discount rate decreases than shorter ones. I'll assume that the average pension plan Projected Benefit Obligation has a duration of 12. If we consider an extreme discount rate decline of 1.6 percent, the plan liability will increase by 19.2 percent. If a plan's assets are matched exactly to its liabilities using duration matching bonds, then there will be a corresponding asset gain to offset the liability loss.

By using these statistics we can create a simple model of the effect on surplus of a worst-case scenario, wherein the equity loss would be 40 percent and the discount rate drops 1.6 percent. The worst-case loss would be:

$$\begin{aligned} & \text{Equity Assets} \times 40\% \\ - & \text{Bond Assets} \times 19\% \\ + & \text{Liability} \times 19\% \end{aligned}$$

For example, assume that a fully funded plan has equity assets of \$150 million, bond assets of \$50 million, and a \$200 million PBO. The worst-case loss would be:

Equity Loss	\$60.0
Bond Gain	(9.5)
Liability Loss	<u>38.0</u>
	88.5

The plan's assets have dropped to \$149.5 million and the PBO has increased to \$238 million. The funded ratio has dropped from 100 percent to 63 percent.

While it is unlikely that a "perfect storm" like this would occur all at once, it can certainly occur over a longer period of time. In fact, the S&P 500 dropped 40 percent from January 2000 to January 2003, while the Moody's Corporate AA yield dropped from 7.9 percent to 6.5 percent, or 1.4 percent over the same period.

Size Does Matter

The purpose of this analysis is not to single out any one company, so the companies will remain anonymous. However, the companies below are all well-known American brands. The data below is taken directly from their annual reports with values as of Dec. 31, 2005, except for Company D, whose year-end was Sept. 30,

2005. The market capitalization value is measured at the same date as the PBO and assets. The PBO and assets include non-U.S. plans (all dollar amounts are in billions).

The data tell four different stories. Companies A and B have a relatively low ratio of PBO to Market Cap, while Companies C and D have a PBO that exceeds the Market Cap by a large margin. Companies A and C are underfunded, and B and D have assets higher than PBO.

It is interesting that, despite the funded status and PBO to Market Cap ratio, the asset allocation is very similar, with equity concentration of 62 percent to 70 percent and bond allocation of 19 percent to 29 percent.

Now let's compute the worst-case loss, or WCL.

This result indicates that the ratio of PBO to Market Cap is much more significant than the funded ratio in measuring pension risk. The lowest funded ratio (Company A at 77 percent) actually has the best risk profile, since it would stand to lose only 3 percent of Market Cap in the worst-case scenario. Company D is well fund-

(continued on page 20)

	A	B	C	D
Market Cap	\$170.0	\$362.60	\$14.2	\$14.5
Plan Assets	\$11.6	\$54.3	\$63.8	\$34.0
Equity %	64%	63%	70%	62%
Bond %	26%	19%	29%	25%
PBO	\$15.0	\$51.4	\$74.6	\$31.3
PBO/Market Cap	9%	14%	525%	216%
Assets/PBO	77%	106%	86%	109%

	A	B	C	D
Equity Assets	\$7.4	\$34.2	\$44.7	\$21.1
a) Equity x 40%	3.0	13.7	17.9	8.4
Bond Assets	3.0	10.3	18.5	8.5
b) Bonds x 19%	0.6	2.0	3.5	1.6
c) PBO x 19%	2.9	9.8	14.2	5.9
WCL = a-b+c	5.3	21.5	28.6	12.7
WCL/Market Cap	3%	6%	201%	88%

ed, but has a small Market Cap, so it could lose 88 percent of its Market Cap.

Company C is in a difficult financial situation with pension liabilities that dwarf the size of the business, and a large union workforce that has negotiated generous benefits over many decades. These legacy costs have impacted its ability to compete and its credit rating has been reduced. While not shown here, the worst-case scenario will obviously result in higher expense and funding requirements. If Company C can't make required contributions, it could face bankruptcy, in which case the PBGC would assume the unfunded liabilities.

Asset Allocation

If you look across the pension plans of American companies, you'll likely see asset allocations similar to these four plans. It is common to see 60 percent to 70 percent in equities and 20 percent to 30 percent in bonds. If the company is strong and has a long-term perspective, it may make sense to invest a higher percentage in equities since equities have been shown to outperform other asset classes over a long period. This assumes that the strong company can withstand the volatility and risk.

However, if the pension obligation is greater than the size of the company, the chances of the company staying in business are lessened, and the company may not be able to take a long-term view of the pension risk. It is no surprise that the PBGC is very interested in the funded status of at-risk companies. The company's employees should also be concerned since their benefits could be cut due to lower PBGC guaranteed benefits.

The risk could be greatly reduced if more assets were invested in duration matching bonds. Consider if all of Company C's assets were invested in bonds. There would be no equity exposure, and the discount rate drop would produce an investment gain of \$12.1 billion to offset the PBO increase of \$14.2 billion. The WCL would only be \$2.1 billion instead of \$28.6 billion. Why wouldn't the CFO of Company C find this attractive?

Company C discloses an expected return on assets of 8.5 percent which is probably consistent with its current asset allocation. If the expected return were reduced to a bond yield, such as the discount rate of 5.6 percent, pension expense would increase by about \$1.8 billion, or about 97 cents a share. This cost increase would almost wipe out all of Company C's EPS. In this case, the increased cost for shifting to all bonds may be a greater issue than the significant pension risk.

Summary

The new FASB rule will require companies to show pension assets and liabilities on the balance sheet, which will highlight the true pension risk. This will improve disclosure and provide new interest in assets that match liabilities. However, many companies will see this new rule as another reason to abandon their defined benefit plans.

Shareholders and regulators should pay attention not only to the funded status, but to the ratio of pension liability to market capitalization. As shown in this article, a severe market correction and/or discount rate decline could wipe out the entire value of a company that is already in financial trouble. ♦

Raymond J. Murphy, FSA, MAAA, EA, is director of pension and savings plans for Bristol-Myers Squibb Company in Plainsboro, N.J. He can be reached at raymond.murphy@bms.com.

Editorial Correction

The following table was printed incorrectly in the June 2006 issue of Pension Section News. The Pension Editorial Staff apologizes for the error they made in its original submission. To the right is the accurate table in its entirety.

	Monthly Annuity Due, 5% interest Deferred Annuity to age 65 for ages less than 65 Immediate Annuity for ages 65 and greater				Change in annuity value from GAM-83 value at the same age		
	GAM-83	UP-94 @ 2005	RP2000 @ 2005	RP2000 Generational	UP-94 @ 2005	RP2000 @ 2005	RP2000 Generational
Male							
35	2.23	2.45	2.48	2.81	9.9%	11.1%	26.0%
45	3.68	4.04	4.08	4.48	9.6%	10.8%	21.6%
55	6.23	6.73	6.79	7.19	8.0%	8.9%	15.4%
65	11.14	11.79	11.78	12.09	5.8%	5.7%	8.5%
75	7.93	8.58	8.37	8.53	8.2%	5.6%	7.5%
85	5.18	5.46	5.12	5.16	5.4%	-1.2%	-0.4%
Female							
35	2.82	2.81	2.72	2.89	-0.5%	-3.8%	2.4%
45	4.63	4.60	4.45	4.66	-0.6%	-3.8%	0.7%
55	7.66	7.60	7.37	7.59	-0.9%	-3.8%	-0.9%
65	13.02	12.95	12.62	12.82	-0.5%	-3.1%	-1.5%
75	9.67	9.77	9.44	9.56	1.1%	-2.4%	-1.1%
85	6.45	6.31	6.15	6.19	-2.1%	-4.5%	-4.0%