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The Pension Crisis !

The crisis facing defined benefit pension plans in America threatens the solvency and financial integrity of our corporations, our cities, our states, and even the U.S. Government. The magnitude of the underfunding of our pension funds suggests that this is the largest financial dilemma since the S&L crisis of the early 1980s. Based on IRS form 5500, corporate pension plans were underfunded by about $465 billion at the end of 2004. However, we estimate that if pension assets and liabilities are properly priced at market, the true economic deficit would probably be 25 to 40% greater than that amount.

While much has been written about the problems faced by corporate pension plans, the Public Pension Fund deficit, according to Morgan Stanley estimates, would balloon to over a $1 trillion if liabilities were marked to market instead of using a constant discount rate equal to the return on asset assumption (ROA). Thus, for both corporate and public pension funds, there are strong arguments to be made that **pension liabilities are significantly understated** and therefore **pension deficits are much greater and more serious than reported.**

In this research article, we take a look at the pension fund problem: how we got to the current situation and the potential solutions. **Our conclusion is that inappropriate accounting rules and actuarial practices have led to inappropriate asset allocation decisions and benchmarks which caused a risk/reward behavior mismatch of pension assets to pension liabilities**. The Society of Actuaries (SOA) in their October 2004 exposure draft made it clear that to properly manage assets versus liabilities you have to focus on economic valuations (economic books) and not accounting valuations. Moreover, FASB is going thru a task force to rethink accounting for pensions and to reach convergence with European accounting standards (FRS 17 and IASB 19) that eliminate much of the inaccurate valuations. Unfortunately, GASB and ASOP are comfortable using ROA estimated asset growth rates to value liabilities. Ryan ALM applauds the recent efforts of the SOA and FASB and prays that America does not lose or damage one of our great financial security blankets … defined benefit pension plans. **Ryan ALM's belief and mission statement is to provide a turnkey solution to the pension dilemma by accurately pricing liabilities as a daily custom index so the asset side can function efficiently and then manage assets as a Portable Alpha Liability System (PALS)**. This dynamic strategy calculates the hurdle rate needed to cure the pension deficit and then manages as well as monitors assets versus liabilities as a daily system of reports delivered via the internet (password protected).

RETURN ON PENSION ASSETS (ROA) AND EARNINGS MANAGEMENT

Decisions by corporate management are driven primarily by the impact on earnings, not liabilities. Since pensions are an expense on the income statement, corporate management seeks to minimize this cost or eliminate it. There are four key items included in the calculation of pension cost (e.g. Service Cost, Interest Cost, Amortization and ROA). The return on pension assets (ROA) is used as an offset to calculate net periodic pension cost. **Generally accepted accounting principles (GAAP) allow corporate management to forecast the ROA a year in advance**. Well, if management knows corporate pension expense a year in advance, it can perform a simple calculation to determine the forecasted ROA necessary to wash out this expense.

If management raises the forecasted ROA above the pension expense breakeven rate, it then creates **pension income** (in lieu of pension expense), resulting in enhanced earnings. The average company in the S&P 500 has enjoyed a 7-10% increase in earnings due to pension income (lower pension expense) for several years with the Aerospace industry receiving as much as a 35% lift in earnings.

But there is a catch. Pension accounting allows this optimistic forecast of ROA only if the corporation's external auditors can validate the forecast from historical return behaviors. All asset classes are treated this way *except* bonds where the prevailing yield to maturity is used instead of historical return patterns. Once bond yields went below the ROA assumption they became a drag on earnings. This led to a **continual** reduction in bond allocations as interest rates declined to historical lows in the late 1990s and early 2000s. Concurrently, this led to an increase in the allocation to equities as well as hedge funds and alternative investments which either had historical returns that validate the ROA or have returns that are somewhat subjective based on book value or appraised value returns (e.g., private equity, real estate).

As a result, bonds as the low risk asset or matching liability asset have not been promoted for asset allocation ever since their market yield fell below the ROA forecast (presumably starting in 1990 when 10-year Treasuries went below 8.00%). Increasing the bond allocation would put more stress on other asset classes to justify the forecasted ROA and consequently less wiggle room for earnings **enhancement**. The forecasted ROA has averaged 8.50% for 2003, 8.80% for 2002, 9.24% for 2001, 9.31% for 2000 and 9.25% for 1999 on the S&P 500 according to an annual study by David Zion of CSFB ("The Magic of Pension Accounting"). The study also shows that actual returns for these five years were -21.85% below the ROA estimates.

ACTUARIAL GAIN / LOSS

Now, what happens if the actual ROA realized by the pension fund differs from the forecasted ROA? The difference is not ignored. Rather, the difference is **amortized**, usually over the average life of the pension plan (15 – 20 years). The accounting profession includes this amortization in **"Actuarial Gain/Loss"**. An actuarial gain augments corporate earnings while an actuarial loss reduces it**.** Corporations don't want earnings volatility so this smoothing process was invented by the accounting profession as a compromise to the pension accounting rules (FAS 87).

With the decline in the equity markets in 2000 thru 2002 and the high forecasted ROA employed by management, the actuarial gain/loss was quite consequential for many plans since the turn of the century. Based on the CSFB report, they estimate that the **actual ROA** for the years 2000, 2001, and 2002 were more like **5.13%, -7.38%, and -8.85%**. Using a **9.12% average forecasted ROA** results in an actuarial loss amortized over the life of the pension plan of about **1% per year** (the difference between the actual and estimated ROA divided by the average life of the plan). The cumulative actuarial loss amortization for the three years 2000 to 2002 of about -3% of pension assets will reduce earnings over the next 12 to 15 years**. GM announced in summer 2003 that this actuarial loss amortization will cost earnings $1.7 billion *per year* for the next 20 years!**

This issue regarding the ROA assumption was highlighted by Warren Buffet in an interview at the end of 2001 in Fortune magazine in which he stated that…

> "Unfortunately, the subject of pension assumptions, critically important though it is, almost never comes up in corporate board meetings… And now, of course, the need for discussion is paramount because these assumptions that are being made, with all eyes looking backward at the glories of the 1990s, are so extreme. I invite you to ask the CFO of a company having a large defined-benefit pension fund what adjustment would need to be made to the company's earnings if its pension assumption was lowered to **6.5%**. And then, if you want to be mean, ask what the company's assumptions were back in 1975 when both stocks and bonds had far higher prospective returns than they do now."

Warren Buffet goes on to warn corporate management that **too high an ROA risks litigation for the CFO, the Board, and the auditors**.

DISCOUNT RATE

In a fashion similar to the ROA methodology, accountants and actuaries price liabilities at a single forecasted growth rate or interest rate. Some say it is a long-term growth rate assumption. The higher the interest rate used by management, the lower the present value of liabilities. A rule of thumb is that for every 50 basis point increase in the interest rate, the present value of the liabilities decreases by about 6.0% to 7.5% for a typical plan (based on a 12 to 15-year average duration). Consequently, management tends to use the highest yield it can find that is a quoted rate acceptable under GAAP (FASB) guidelines as the discount rate.

Traditionally, this was the Moody's AA long corporate yield. Unfortunately, this yield belongs in a financial museum; it is not a yield that should have been used to determine the value of liabilities for GAAP purposes. The Moody's AA corporate index was designed in 1929 and consists of **only long-maturity industrials and utilities (about 16 bonds)**… **with no finance issues** which today comprise over 50% of the corporate investment grade bond market.

The Securities and Exchange Commission in a 1993 letter to the Financial Accounting Standards Board suggested that the guidance provided in FASB 106, paragraph 186 (GAAP) is an appropriate

guideline for discounting pension liabilities. This paragraph states:

> "The objective of selecting assumed discount rates is to measure the single amount that, if invested at the measurement date in a portfolio of high-quality debt instruments, would provide the necessary future cash flows to pay the accumulated benefits when due. Notionally, that single amount ... would **equal the current market value of a portfolio of high-quality zero coupon bonds whose maturity dates and amounts would be the same as the timing and amount of the expected future benefit payments**."

FASB is clear that zero-coupon bonds (as a yield curve) are the proper, if not preferred, discount rate methodology — but it qualifies "high-quality" to include AA and AAA corporates. Since zero-coupon corporates hardly exist, and since the longest duration on corporate coupon bonds is around 15 years, the FASB permits an extrapolated yield curve, provided it is based on current interest rate levels.

Because the pension plan liabilities are bond-like, their true growth rate is no more stable than a long bond portfolio. Year-to-year liability fluctuations can easily amount to double-digit growth rates or even negative growth for liabilities, but most of these fluctuations do not get reported in the current year's pension expenses. Only the forecasted discount rate growth is recognized (beginning year discount rate). The ending year discount rate liability valuation (present value) divided by beginning year valuation (annual growth) is then compared to this estimated growth and the difference is amortized over the life of the plan (just like asset growth differences between estimated vs. actual are amortized)**.** This liability amortization is also posted in the actuarial gain/loss line item versus earnings.

The higher the discount rate used to value liabilities, the lower the present value of the liabilities. But using an incorrect interest rate will produce the wrong risk and reward behavior. **The mission here should be to present proper liability valuation and behavior through proper discount rate pricing!**

How could all liabilities be priced at one single interest rate? Until real market rates are used that reflect the true cost to a pension plan to defease the liabilities, there will be inaccuracies. By definition, only zero-coupon bonds can be used to price liabilities since coupon bonds do not have durations greater than 15-years and, as a result, can not defease, match or price such liabilities.

The confusion here is that GAAP allows annuity rates offered by life insurance companies to be used to price liabilities. Annuities are quoted as a single rate. However, an annuity rate is a negotiated rate and the same rate is not available freely to all pension plans. A $200 million plan would get a preferred rate compared to a $5 million plan but a pension plan above $1 billion may find it impossible to get any annuity rate for that size (none recorded yet). Since the top 100 corporate defined-benefit plans have assets that exceed $1 billion, this applies to most corporate defined benefit plans wealth.

Defined benefit plans sponsored by state and local governments are governed by ASOP 27 rules wherein the liability discount rate selected should match the ROA assumption. This actuarial practice makes no economic sense. What does asset growth have to do with liability growth (two different portfolios = two different growth rates). With ROA assumptions around 8% and market rates for Treasury zeroes lower than 5% (10-year duration), most public plans are about 300 basis points too high with their discount rate. At an average duration of 10-15 years on pension liabilities, this means that the liabilities are undervalued by 30% to 45%. If the Public plan thought it was fully funded (funded ratio of 100%), the actual funding ratio (at market) could be 70% or even 55%!

Unfortunately, this is too common a situation for state and local government pension funds—and not an isolated happening. Throughout public pension land, pension liabilities are a much higher valuation than reported, yet **public pension plans continue to raise benefits when they cannot afford to do so**.

Many pension plan sponsors have been misled to believe that the discount rate on liabilities is their hurdle rate. If asset returns outperform this rate, it is believed that a surplus will be created. This is just not so! **In truth, the liability discount rate is a price and not a return.** Just like any bond portfolio the yield on a bond is its price and not its annual total return or growth. Liability growth is volatile depending upon changes in market interest rates. Liability growth can be quite high if rates decline year-over-year (bull market) or it can enjoy negative growth if rates rise year-over-year (bear market). Until liabilities are priced at the market accurately and frequently, pension plan sponsors will never know the true economic return (growth) behavior of liabilities.

The growth rate of the present value of liabilities can be viewed as a liability return. It is this liability return that is the plan sponsor's opponent or benchmark (hurdle rate) annually, and not the liability discount rate. Yet, as Warren Buffet remarked, there is little discussion in board rooms about liability returns. Certainly, in establishing benchmarks for external money managers, plan sponsors focus on generic asset class indexes. Yet, these indexes may have little to do with the growth in liabilities (i.e. liability returns). The correct approach is for a plan sponsor to generate a **CUSTOM LIABILITY INDEX** based on its liability cash flow structure and properly discounted (priced) using **market** interest rates not estimated single discount rates.

THE LIABILITY SIDE

Most, if not all, of the GAAP and IRS interpretations are done to enhance financial statements with little concern for asset/liability management (ALM). Imagine that you are asked to manage the assets of a defined benefit plan. You are told **the objective is to fund the pension liabilities at the lowest cost and lowest risk to the plan**. You are then told that the liabilities are priced at a single discount rate that is not a market rate and the liabilities are reported to you annually, months delinquent. Moreover, the liability structure (portfolio) is not given to you. Could you manage assets or perform the asset allocation decisions with this information? Could you function versus the S&P 500 or any asset index if it came out annually, months delinquent and you

never saw the portfolio and the prices used were not market prices but the same price (yield) for each security? Of course not. So how could Asset / Liability Management (ALM) operate any differently?

The solution is obvious. Until liabilities are priced at the market with complete transparency and accuracy, pension funds bear the risk of an asset/liability disconnect which could have financially disastrous consequences similar to the S&L crisis. Liabilities should be priced using a market yield curve. A rule should be created and enforced that reads:

If you cannot buy it, you cannot use it as a discount rate!

The solution starts with the Treasury zero-coupon yield curve (Treasury **STRIPS**). At the moment, these are the only high-quality zero-coupon rates that can be purchased (defease) in size for every maturity of the Treasury yield curve. There are very few corporate zero-coupon bonds. Also, the duration (i.e., interest rate sensitivity) of corporate coupon bonds peak around 15 years, so how do you price liabilities past 15 years?

Until sponsors of defined benefit plans build a customized liability index based upon the unique actuarial term structure shape of that plan and price the liabilities off of real zero-coupon bonds, pension assets are in jeopardy of being managed versus the wrong risk/reward objective. Currently, pension assets are typically managed versus generic asset market indexes not liability indexes. If you outperform the S&P 500 but lose to liabilities … you lose!

The pension industry should demand accurate accounting (pricing) of pension assets and liabilities. Only mark-to-market accounting provides this. Pension aid should not come in the form of incorrect liability pricing that distorts the true asset/liability funded ratio. We should demand accurate pricing of pension liabilities using real market rates (Treasury zero-coupon yield curve) weighted by the projected schedule of actuarial benefit payments.

THE ASSET SIDE

Once a pension sponsor creates a customized liability index that can be used as a benchmark, the asset side can now function effectively towards the liability funding objective. This would allow for the achievement of cost and risk budgeting goals. Asset allocation and performance measurement models can then compare accurately the growth and risk behavior of assets versus liabilities by term structure. If any and all asset classes are not measured versus liabilities, then assets seemingly have the wrong index objective. As a result … **Given the wrong index objective, you will get the wrong risk/reward behavior!**

The notion of active and indexing management follows naturally given a correctly priced liability return index. For plan sponsors that seek to follow an indexing strategy, they can pursue a cash flow matching strategy by buying Treasury STRIPS that replicate the liability structure thus achieving the **lowest risk portfolio**. Note that plan sponsors can not hedge completely their liability risk with corporate bonds because of the absence of long duration zero-coupon bonds. Unfortunately, advocates of pricing liabilities using Treasury STRIPS are sometimes viewed as advocates of allocating 100% of pension assets solely to high quality bonds. That is not

the case. A correctly priced customized liability index is compatible with active management.

Active asset/liability management allows for deviations from a benchmark index to create a surplus (outperform the custom liability index). Active managers can properly construct a portfolio to determine what risks they are willing to tolerate and to project an acceptable tracking error. With a custom liability index, plan sponsors and their consultants can behave as usual by just replacing generic index benchmarks with the appropriate liability benchmark.

CONTRIBUTIONS

Corporation management doesn't want to use cash for noncore functions. Pension contributions are "real" cash outlays that are paid annually and quite often are not budgeted. Corporations want a pension holiday: a period where there are no pension contributions. Since the amount of the contribution is based on the asset/liability funded ratio, IRS rules dealing with pension funds apply. In computing the liability (the denominator in the funded ratio) the IRS uses a weighted average formula discount rate based on the last four years (40% current year, 30% last year, 20% two years ago, 10% three years ago) of a blend of three corporate bond indexes (new Pension Act of 2004) equally weighted with a corridor of 90% to 120% of that weighted rate. Since interest rates are quite volatile, this concoction could never represent an accurate pricing of liabilities. In a bull market trend, this blended formula would always be too high a rate versus current interest rate levels (and vice versa in a prolonged bear market). Moreover, the corridor of 90% to 120% is used to protect a pension plan from making contributions, suggesting that the plan has to be seriously underfunded to face a higher or any contribution. But this seems to be the current environment. Even the sharpest pension pencils cannot prevent higher contributions today.

Public plans have been hard hit by budget shocks where their contribution rate as a % of payroll has jumped up more than 50% for many plans over the last five years. Moreover, this contribution rate in dollars per year has spiked up more than 100% for numerous public plans. This situation arose from a series of linked events. First, the pricing of liabilities in conformity to ASOP 27 suggested to Public plans that their funded ratio was much higher than economically accurate (market valuation). This led many public plans in the 1999 thru 2004 period to increase benefits when they could not afford to do so or to reduce their contribution rate thinking they were well funded … or both situations. The common evaluation of "actuarially sound" seen on most actuarial valuation reports is misunderstood by many public plans. It suggests that if you make the required contributions (as a fixed level % of payroll) and if assets grow at the ROA rate, then the plan will be able to pay the projected benefits given the current size of assets. This required contribution unfortunately may be unaffordable by many public plans. Moreover, it is most difficult to forecast the ROA with any accuracy. All of these events led to the largest issuance of bonds (POB) in Public fund history to cure pension deficits and hopefully reduce future contributions.

PENSION FUNDING EQUITY ACT OF 2004

On April 10, 2004 President Bush signed into law the Pension Funding Equity Act of 2004 ("Act," hereafter), designed to provide "relief" to corporate-sponsored defined benefit plans. The motivation for the new Act was explained in the proposal summarizing the bill that was provided by the House Committee on Education and the Workforce. The bill summary stated that the Act would : (http://edworkforce.house.gov/issues/108th/workforce/pension/3108summary.htm)

- "protect the retirement benefits of millions of American workers and help ensure that their pension benefits will be there when they retire. Strengthen defined benefit pension plans in the short term while the Education & Workforce Committee takes a broader look at the defined benefit system and the issues that affect the retirement security of American workers."

The Act provided relief by allowing corporate sponsors of defined benefit plans to use a higher discount rate in valuing liabilities. It has been estimated that this lowered liabilities such that contributions were reduced by more than $80 billion in the years 2004 and 2005. Moreover, the airline and steel industries were allowed to defer 80% of their deficit reduction contributions in years 2004 and 2005 to future years representing $1.6 billion in extra pension relief (source: Magic of Pension Accounting, CSFB, David Zion).

Under the new Pension Funding Equity Act of April 2004, a composite of three corporate bond indexes are now used to create a single discount rate based upon a weighted average of the last four years. There are numerous problems associated with this approach to valuing liabilities. How a weighted average of the last four years could represent the current yield environment is an unsolved mystery. Using a single discount rate to value an entire cash flow schedule of liabilities is regrettable and inconsistent with the basic principles of financial valuation. Moreover, there are no zero-coupon bonds in these three indexes with the longest duration coupon bonds less than 16 years suggesting they could not properly value long liabilities.

Unfortunately, the Act solved none of the key (accounting) problem areas and may have created new ones. The information that sponsors are permitted to report continues to provide poor financial information about the health of their defined benefit pension plans. the Act supports the use of a AA (even single A) corporate bond index. Yet, in support of the Act, law makers have pointed out that: "Short-Term Pension Fix Provides Greater Certainty for Working Families and Employers While Highlighting Need for Prompt Action to Find Permanent Solution." **This claim is simply not true**.

The Act fosters the use of the wrong index(s) as the valuation rate for plan sponsors. Only a liability index customized to a pension plan's actuarial schedule could ever properly calculate and measure each pension plan's true funding position. We can understand that pension relief may be in the form of delaying the minimum contribution until the deficit or true funded ratio is at a certain level of danger. We can understand providing a deficit tolerance over several years may be needed to give pensions plans time to heal. We can NOT understand permitting the mispricing of liabilities as a long-term cure. **Financial lies should not be tolerated!**

SOLUTIONS

The true objective of a pension is to fund the liabilities at the lowest cost to the plan and ideally, with low risk. The following pension solutions and strategies apply to all pension plans especially those with true economic deficits :

1. **Custom Liability Index**

Until liabilities are priced accurately (at the market), frequently (daily) and with complete transparency (internet delivery) how could the asset side function on Asset Allocation, Asset Management and Performance Measurement. In the words of Confucius…

"given the wrong index benchmark, you will get the wrong risk/reward behavior"

Our research article **Pension Solution #1 Custom Liability Index** (www.ryanalm/research.com) details clearly our ALERT System which provides clients with a daily index matched to the actuarial benefit payment schedule and priced at the market. This index should be the proper benchmark for all asset side functions and will provide timely and accurate information to the Plan Sponsor.

2. **Liability Index Fund**

If you have a deficit, you need time to cure this deficiency. The issuance of POB bonds is a common strategy for Public pension plans as their way of buying time. This certainly buys time but has costs (POB interest rate versus **accurate** discount rate) and risks (different duration) to consider. Corporations have avoided this strategy so far with the exception of GM in 2003.

Another strategy here is to **match assets vs. liabilities (Liability Index Fund)** for the time needed to cure the deficit… **Buy Time!** If you have a 30% deficit and decide that 10 years is needed as the curing period then assets have to outperform liabilities by 3% annually to reach full funding. Match assets to the first 10-years of liabilities through a Liability Index Fund and move the deficit to the liability tail. You now can focus on deficit elimination strategies over the next 10-years. Given a Custom Liability Index benchmark, you now can monitor accurately the true economic progress on curing this deficit.

Remember liabilities should be priced as a zero-coupon bond portfolio (Government securities) for proper economic valuation. This suggests a very low yielding opponent. Outperforming this benchmark should not be difficult over time especially if interest rates trend upward causing negative liability present value growth.

3. **Portable Alpha Liability Strategy (PALS)**

If you have a deficit you certainly can't use 100% bonds to recover. You must allocate to other asset classes that you believe have a high probability of outperforming the growth rate of liabilities over some time horizon (the deficit curing period). Equities, real estate, alternative investments are very attractive asset classes if given time. The key is to **BUY TIME** and then **MONITOR** assets versus liabilities to know exactly

how well the assets are performing versus the liabilities they are funding (i.e. equities vs. long liabilities). When the deficit has been erased a change in strategy may be appropriate where you now focus on securing this surplus (game won) and eliminate the risk of future deficits.

PALS is a Liability Hedge Fund that is entirely focused on liabilities. Hedge funds are popular today but one that has liabilities as its objective is rare. Sounds like Confucius all over again. Portable Alpha strategies seem to be the strategy wave of the future but once again hard to find a liability objective strategy here.

The PALS strategy is certainly a unique and prudent concept for all pension plans with a deficit. Once a target deficit area of liabilities is picked, PALS builds a **Beta portfolio of zero-coupon bonds to preserve 100% of the principal over the time horizon chosen (time to cure the deficit)** and an **Alpha portfolio of equities designed to outperform the target liability deficit area chosen (cure 100% of the deficit).** Our Custom Liability Index provides a hurdle rate that determines the rate of return needed to outperform liabilities (Alpha). Finally, the correct measurement of Alpha has been calculated as the excess return above the liability growth rate instead of outperforming some generic index benchmark. Once you earn Alpha, you now start to cure the deficit. The deficit is then added to the hurdle rate (liability index growth rate = Alpha) to create a true economic return target. **Once we outperform this true economic hurdle rate, all excess returns (Surplus) are ported over (Portable Alpha) to the Beta portfolio thus securing the surplus by buying zero-coupon bonds to match the future value of liabilities (no deficit).**

For more information on PALS, please contact us directly at 888-Ryan ALM or visit our web site under Research for … **Pension Solution #2 : Portable Alpha Liability System (PALS).**

It is never too late to start doing what is right …Henry Wadsworth Longfellow.

God Bless America's Pensions !