Pension Discount Rates:
FASB ASC 715
(formerly FAS 158)

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At the end of each fiscal year, plan sponsors must select a discount rate to use in valuing the liabilities of their pension plan for GAAP accounting purposes. As a result, the choice of discount rates will affect the balance sheet and credit rating. In addition, the disclosed discount rate will be used to determine FASB ASC 715 pension expense/income for the fiscal year as it affects service cost (present value of benefits attributed to service to be rendered), interest cost (increase in the PBO liability due to the passage of time… one more fiscal year) and amortization of unrecognized gains/losses (difference between actual experience and projections). Under FASB ASC 715, this discount rate should be based on the current market rates for high quality (AAA – AA) corporate bonds as *zero-coupon bonds* and will be discussed in the footnotes to the financial statement. The problem is there are little or no zero-coupon bonds in the market place today. As a result, the ASC 715 discount rates have to be a manufactured AA corporate zero-coupon yield curve.

When FAS 158 became effective December 15, 2006, Ryan ALM created a series of discount rates in conformity to then FAS 158 (now ASC 715). Our initial and continuous client has been a BIG 4 accounting firm which hopefully testifies to the integrity of our data. We now have several actuarial firms and corporations using our discount rates today. We believe our discount rates consistently provide high discount rates that are in conformity with ASC 715, well documented and validated by auditors. Because of our usually higher discount rates, it should enhance financial statements and credit ratings. **Ryan ALM provides four distinct zero-coupon discount rate yield curves plus a cash flow matching discount rate yield curve.**

ASC 715-30-35-44 Accounting Rule on Discount Rates
Same as: FAS 158 paragraph 44A; FAS 87 (Amended) and FAS 106, paragraph 186

"Pursuant to paragraph 44, an employer may look to rates of return on high-quality fixed income investments in determining assumed discount rates. The objective of selecting assumed discount rates using that method 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 pension benefits when due. Notionally, that single amount, the projected benefit obligation 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. Because cash inflows would equal cash outflows in timing and amount, there would be no reinvestment risk in the yields to maturity of the portfolio. However, in other than a zero coupon portfolio, such as a portfolio of long-term debt instruments that pay semiannual interest payments or whose maturities do not extend far enough into the future to meet expected benefit payments, the assumed discount rates (the yield to maturity) need to incorporate expected reinvestment rates available in the future. Those rates shall be extrapolated from the existing yield curve at the measurement date. The determination of the assumed discount rate is separate from the determination of the expected rate of return on plan assets whenever the actual portfolio differs from the hypothetical portfolio above. Assumed discount rates shall be reevaluated at each measurement date. If the general level of interest rates rises or declines, the assumed discount rates shall change in a similar manner."

AA Corporate Zero-Coupon Discount Rates

Ryan ALM provides *four distinct discount rate yield curves* that best conform to GAAP requirements. Each curve is comprised of hypothetical AA corporate zero-coupon bonds from 0.5 -30+ years to maturity:

High End Select	**(top 10% yielding bonds)**
Top 1/3 Curve	**(top 33% yielding bonds)**
Above Median Curve	**(top 50% yielding bonds)**
Full Curve	**(all 100% yielding bonds)**

Each yield curve is derived from actual AA and AAA corporate bonds placed into eight maturity bands (except High End Select that uses 10 maturity bands):

Parameters of Eight (8) Maturity Bands:

Ratings	**AA+**
Minimum Issue Size	**$100 million**
Currency	**U.S. Dollar Denominated**
Coupon	**Non zero, fixed coupon bonds**
Maturity Type	**Option Free (No putable or callable bonds)**
Issue Type	**Publicly traded U.S. Corporate bonds**
	Private placements with 6 months seasoning
	No Foreign Agencies, Govt., Supranationals
Pricing	**Excludes bonds priced outside $55 - $145 range**
Yields	**Excludes YTM > 2.0 standard deviations from avg YTM**

High End Select - Discount Rate Yield Curve

Designed for smaller plans, Ryan ALM provides a 4th zero-coupon discount rate option… High End Select. This has the same methodology as the other three discount rate curves with the following exception… ten maturity bands with number of bonds limited to:

1st and 10th maturity band = 2x the number of years in the band
2nd thru 9th maturity band = 1x the number of years in the band

Maturity Band (years)	1.01-2.00	2.01-4.00	4.01-6.00	6.01-9.00	9.01-12.00	12.01-15.00	15.01-18.00	18.01-22.00	22.01-26.00	26.01-30.00
# of Bond Issues Selected	2	2	2	3	3	3	3	4	4	8

Par Curve

Given the yield curve parameters, a universe of bonds is selected. Using vendor bid/ask mid-point prices and a proprietary system developed by Ryan ALM, total market value (price + accrued interest), YTM and TERM values are calculated for each qualifying bond and placed into eight (8) maturity bands. For each of the maturity bands, the market weighted average TERM and yield to maturity (YTM) is calculated. A semi-annual yield curve (60 points from 0.5 to 30.0 years) is created by applying a *5th order polynomial least squares curve fit* technique. The least squares option of the 5th order curve fit is where the summation of the squares of the residuals of all the data points has the smallest value or deviation. As a result, this technique produces a *best fit* yield curve providing a smooth and continuous yield curve between 8 points (maturity bands).

Spot Rate Yield Curve:

A zero-coupon spot rate yield curve is developed by using a *Bootstrapping* technique from the par curve. Bootstrapping is a process of building up discount rates which equate the cash flows of a yield curve of semi-annual coupon bonds to a hypothetical yield curve of zero-coupon bonds derived from the Par Curve. This hypothetical zero-coupon yield curve is referred to as the "Spot Rate Curve". The spot rate curve is then converted to annualized yields or APR (Annual Percentage Rate).

ASC 715 Discount Rates Comparisons

The Ryan ALM ASC 715 discount rates consistently demonstrate a higher yield than the Citigroup discount rates. Historically, the yield difference is as follows:

Top 1/3   =   21 to 84 basis points
Above Median   =   11 to 62 basis points
Full Curve   =   -1 to 27 basis points

Based on *Above Median* discount rates, for every $1 billion in projected liability benefit payments the reduction in present value could be $11 to $62 million versus Citigroup discount rates.

Cash Flow Matching Discount Rates

Ryan ALM created the cash flow matching model as an alternative to our ASC 715 spot rate yield curves, and in conformity to ASC 715-30-35-44 for companies that prefer to develop pension and OPEB discount rates using cash flows from any particular pension or OPEB projected benefit payment schedule. The Ryan ALM cash flow matching pricing model can be used at any calendar month end measurement date to develop the ASC 715 discount rate for a benefit obligation of any size or duration. To develop the model requires the projected benefit payment schedule of the particular pension or OPEB plan. For more details, please contact us at Contact@RyanALM.com or 561-656-2014 on the methodology and procedure.

Liability Beta Portfolio™ (LBP)

Objective

To **de-risk** the pension gradually and reduce Contribution costs, Ryan ALM provides our LBP *cash flow matching* asset management product. Our LBP will match and fund liabilities at the lowest cost and risk to the pension plan. The LBP is the proper *core portfolio* to replace active bond management and to better meet the true objective of the plan.

Methodology

Our LBP is a **cost optimization model** that searches and calculates the lowest cost portfolio that will cash flow match and fund the projected liability benefit payment schedule. This requires numerous iterations. The LBP model buys longer maturities with much higher yields whose cash flows (interest income + principal) will fund shorter liability benefit payments at lower cost. Bond math proves… longer maturities + higher yields = cost savings. Our LBP **cost savings is estimated at 8% to 12%** of present value of liabilities (back tested since 12/31/09).

> **Requires projected benefit payments schedule**
> **Universe = A/BBB corporate bonds**
> **No credit > 3% of LBP model**
> **Skewed to longer maturities**

Benefits

The LBP model will produce significant and numerous benefits to the pension plan:

> **Outyield liabilities by @100 bps (vs. AA corporate discount rates)**
> **Outyield active bond management… enhances ROA**
> **Reduces Volatility of Funded Ratio/Status**
> **Reduces Funding costs (@ 8% to 12%)**
> **Reduces Interest Rate Risk**

Note

Duration matching and LDI strategies are *not* cost efficient strategies. They usually fund each liability with a bond with the same duration. A five year liability funded with a five year duration bond will cost 8% to 12% more than using the LBP model to cash flow match liabilities. Since there are no zero-coupon corporates and since corporate coupon bonds duration's peak around 16 years… this requires Treasury STRIPS to fund liabilities thereafter. The **LBP model is @ 26% less costly than Buyout Annuities and Treasury STRIPS, and 8% -12% less costly than AA corporates**.