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The Ryan ALM Pension Letter™

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Index	Returns YTD 2018	Weights
Pension Liabilities:		
Market (Tsy STRIPS)	-5.34%	100 %
ASC 715 (FAS 158)	-5.10	
PPA (MAP 21 = 3 Segments)	4.94	
PPA (Spot Rates)	-2.92	
GASB /ASOP (7.50% ROA)	5.92	
Pension Assets:		
Ryan Cash	1.39 %	5 %
Bloomberg Barclay Aggregate	-1.60	30
S&P 500	10.56	60
MSCI EAFE Int'l	-0.99	5
Asset Allocation Model	5.83 %	100 %
Pension Assets – Liabilities:		
Market	11.17	
ASC 715 (FAS 158)	10.93	
PPA (MAP 21 = 3 Segments)	0.89	
PPA (Spot Rates)	8.75	
GASB/ASOP (7.50% ROA)	-0.09	

William F. Sharpe
Lifetime Achievement Award

Money Management Letter
Lifetime Achievement Award

Capital Link
Most Innovative ETF Award

IMN
ETF of the Year Award

Bernstein Fabozzi/Jacobs Levy
Research Paper of the Year Award



Using the Asset Allocation return above, the difference in pension asset growth vs. liabilities in 2017 was: **11.17%** (market valuation STRIPS), **10.93%** (ASC 715), **0.89%** (PPA 3-segment rates), **8.75%** (PPA-Spot Rates) and **-0.09%** (GASB/ ASOP). Such valuations show the significant difference in not using *market* valuations. Most pension funds enjoyed a funded ratio surplus in 1999 but **pension asset growth has underperformed liability growth since by an estimated -123.21%** on a compounded index basis starting at 100 on 12/31/99!

	Total Returns									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Assets	-2.50	-5.40	-11.41	20.04	8.92	4.43	12.25	6.82	-24.47	19.43
Liabilities	25.96	3.08	19.47	1.96	9.35	8.87	0.81	11.76	33.93	-19.52
Difference:										
Annual	-28.46	-8.48	-30.89	18.08	-0.43	-4.44	11.44	-4.94	-58.40	38.95
Cumulative		-37.60	-73.40	-60.08	-66.13	-76.75	-64.60	-77.50	-181.53	-106.9
	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Assets	11.89	3.27	11.79	19.04	9.74	1.22	8.12	15.15	5.83	
Liabilities	10.13	33.77	4.46	-12.59	24.35	-0.49	1.92	7.94	-5.34	
Difference:										
Annual	1.76	-30.50	7.33	31.63	-14.61	1.71	6.20	7.21	11.17	
Cumulative	-115.67	-195.73	-194.30	-120.74	-177.14	-172.78	-163.36	-160.34	-123.21	

Truth in Accounting Latest Financial State of States Report

The latest annual report by Truth in Accounting (TIA) on the financial budget states of the 50 states shows a comprehensive analysis of the fiscal health of all 50 states based on fiscal year 2017 comprehensive annual financial reports (CAFRs). The best and worst states based on budget surplus and deficit per taxpayer as follows:

Best:	Alaska	\$56,500 per taxpayer (Surplus)
	North Dakota	\$24,900
	Wyoming	\$19,600
	Utah	\$4,400
	South Dakota	\$3,100

Worst:	New Jersey	- \$61,400 per taxpayer (Deficit)
	Connecticut	- \$53,400
	Illinois	- \$50,800
	Kentucky	- \$39,200
	Massachusetts	- \$33,900

OPEB Reporting Rule Starts in FY 2018

A new financial reporting rule taking effect for the 2018 fiscal year will require states to report all unfunded other post-employment benefits (OPEB), particularly health care benefits, on their balance sheet. In FY 2017, total unfunded OPEB liabilities among the 50 states was \$663.1 billion, with \$439.5 billion not reported on the balance sheet (hidden debt). The largest hidden debt according to the TIA study are:

New York	\$69.7 billion
Texas	\$58.8 billion
California	\$58.4 billion
Illinois	\$36.1 billion
New Jersey	\$34.3 billion

Accounting Tricks States Use to Balance Budgets

Every state, except Vermont, has balanced budget requirements. So how could states report an accumulated \$1.5 trillion in budget deficits. The truth is states balance budgets using accounting tricks, such as these reported by TIA:

1. Inflating revenue assumptions
2. Counting borrowed money as income
3. Understating the true costs of government
4. Delaying the payment of current bills until the next fiscal year
5. Hiding a large portion of employee compensation from the balance sheet and budget

Most States Issue Delinquent Annual Financial Statements

Timely financial information is crucial to make prudent government decisions... such as creating a budget. However, most states issue their annual financial reports late. The Government Financial Officers Association (GFOA) standard is to publish your CAFR within 180 days after the end of the fiscal year. The national average is 196 days. By contrast, most corporate financial reports are issued within 45 days of their fiscal year ends. The most delinquent states in filing their 2017 CAFR were:

Alabama	N/A
New Mexico	399 days
New Jersey	272
California	264
Nevada	258
Arizona	258
Illinois	258
Mississippi	231

Public Pension Discount Rate is Deeply Flawed

According to Richard Keevey, former budget director and comptroller for New Jersey, feels that the ROA (Return On Asset assumption) used as the discount rate for pension liabilities is a deeply flawed approach. It violates finance theory, which posits that a proper discount rate should reflect the riskiness of the liability and not the riskiness of the asset. It also contrasts significantly with how private firms and other countries value pensions. He continues to say that because pensions are generally protected by law and are likely to be paid even if poorly funded, the discount rate should reflect bond-market rates for low-risk assets, such as Treasury Bills. All state and local governments should be required to use a risk-free discount rate to determine liabilities. We applaud Mr. Keevey keen insights and add that the proper discount rate(s) should be the risk-free rate that settles liabilities. It must be a rate(s) that you can buy to defease liabilities. If you cannot buy the discount rate it is of no use or a financial lie. By definition, the **only appropriate discount rate is the U.S. Treasury STRIPS yield curve.**

CBO Revises Cost Estimate from \$101 to \$34 billion Cost for Multiemployer Bailout

The Congressional Budget Office (CBO) released a report Sept. 12 to the Joint Select Committee on Solvency of Multiemployer Pension Plans revising their estimated cost of a federal loan bailout to multiemployer plans from \$101 to \$34 billion. This federal loan is the centerpiece of the Butch Lewis Act proposal. These cost changes make the BLA a better Bill says Sen. Sherrod Brown (D-Ohio). The BLA solves the multiemployer pension crisis without pension cuts for less than half the cost of alternative legislation proposals. The alternative is the Pension Benefit Guaranty Corp. (PBGC) which has a maximum benefit cap of around \$14,000 per participant and would represent major benefit cuts. Moreover, the PBGC is less solvent than most multiemployer plans.

Congress Approved \$2.4 trillion in Additional Debt for FY 2018

According to the Committee for a Responsible Federal Budget (CFRB) Congress approved \$2.4 trillion in debt passed in FY 2018 that will add to the Federal Budget through 2027. The added debt includes \$45 billion in deficit spending for FY 2019. The CBO has projected that debt held by the public would rise from \$14.6 trillion in 2017 to \$27.1 trillion in 2027. This will increase projected debt from 86% of GDP to 94%.

U.S. Postal Retiree Health Benefits Unsustainable

The U.S. Postal Service Retiree Health Benefits Fund pays for about 500,00 retirees. The Postal Service has not made the \$38.2 billion in required payments to this fund through fiscal 2017. If it makes no future funding to this plan, the Office of Personnel Management projects the fund will be depleted in fiscal year 2030. The GAO found that the fund's assets declined to \$49.8 billion and unfunded liabilities rose to \$62.2 billion at the end of fiscal year 2017. The USPS

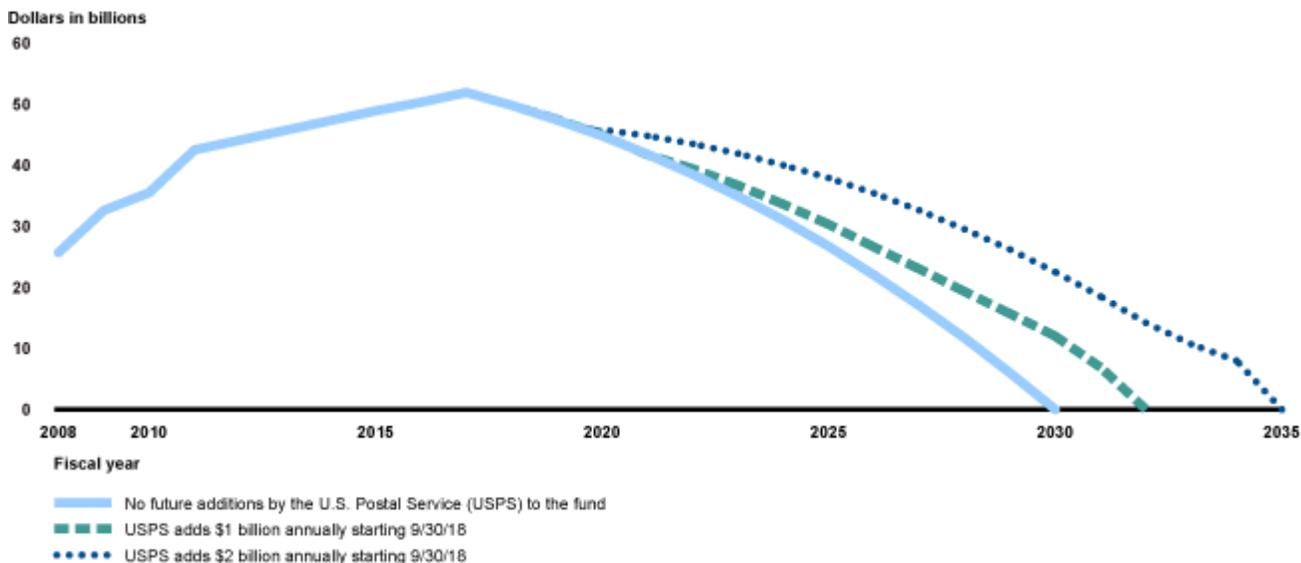
has said that its required payments to the Fund are unaffordable relative to its current financial situation and outlook.

Scenarios for the U.S. Postal Service (USPS) Retiree Health Benefits Fund:

If no annual payments, Fund would become insolvent by 2030.

Annual payments of \$1 billion would extend the life of the Fund to 2032

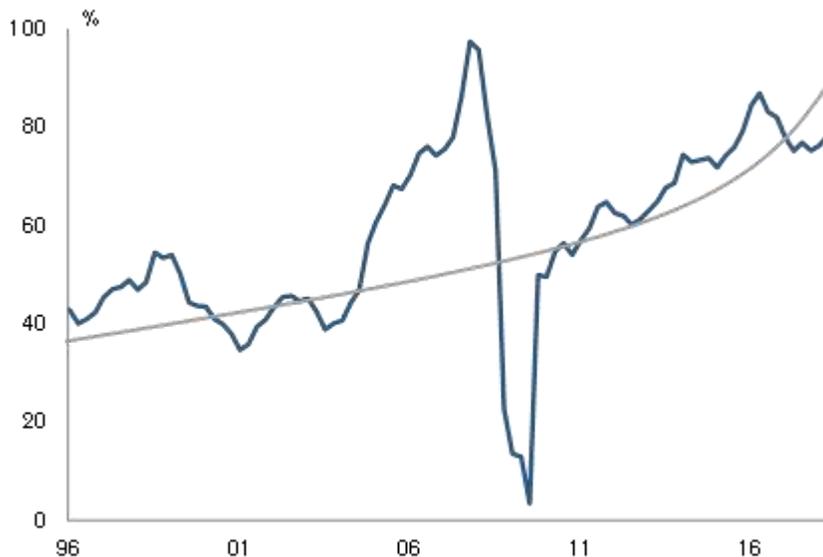
Annual payments of \$2 billion would extend the life of the Fund to 2035



Source: GAO evaluation of U.S. Office of Personnel Management projections. | GAO-18-602

S&P 500: Dividends + Buybacks / Sales

The ratio of dividends + buybacks as a % of sales has trended upward since 2010 and is reaching toward the recent high of 2015 and seems to be on track to test the high of 2008. This provides a lift in stock prices.



ROA and Contributions Calculation Confusion

Actuarial practices (ASOP 27) use the ROA to calculate projected contributions. In essence, the projected contributions + the growth of current assets at the ROA should fully fund the pension plan over an amortization period (30-years). The problem becomes when there is a significant funded status deficit as most plans have. If you grow the current assets market value by the annual ROA and then grow the actuarial valuation of liabilities (based on the ROA as the discount rate) by the same ROA growth rate... the funded status deficit also grows at the ROA. The difference in the dollar growth of assets vs. liabilities results in a higher contribution to fund this new deficit. The example below shows \$60 of assets and \$100 of liabilities both growing at the ROA of 8%. This creates a funded ratio of 60% and a funded status of (\$40). In just five years, the dollar deficit grows 46.9%... and so does projected contributions? This **ASOP contribution procedure has no input for assets to ever outgrow liabilities!** Therein lies the problem.

Assets = \$60
Liabilities = \$100
Funded Ratio = 60%
Funded Status = (\$40)
ROA = 8% Growth rate for Assets + Liabilities
Deficit = Can *only* be reduced thru Contributions

	<u>Growth Rate = 8% ROA</u>				<u>Funded</u>	
	<u>Assets</u>	<u>\$ Growth</u>	<u>Liabilities</u>	<u>\$ Growth</u>	<u>Ratio</u>	<u>Status</u>
Start	\$60.00	\$ 4.80	\$100.00	\$ 8.00	60%	\$ 40.00
Year 1	64.80	5.18	108.00	8.64	60	43.20
Year 2	69.98	5.60	116.64	9.33	60	46.66
Year 3	75.58	6.05	125.97	10.07	60	50.39
Year 4	81.63	6.53	136.05	10.88	60	54.42
Year 5	88.16	7.05	146.93	11.72	60	58.77

At same growth rate (ROA) Funded Ratio stable... but deficit increases 46.9% !

Solution: Assets Outgrow Liabilities

If assets and liabilities were marked to market (economic books), each pension plan would understand the true economics of their plan. GASB accounting rules distort economic reality by allowing a discount rate based on the ROA. Pension liabilities are a term structure of benefit payments. No single discount rate could ever price liabilities accurately. The Society of Actuaries (SOA) recommended that pensions create a set of *economic books* to help assets understand and manage to these liabilities. If interest rates stay the same or rise as a secular trend over the next five years, liability growth would be very low to even negative growth.

Solution: If the market value of assets would outgrow the market value of liabilities... the funded status improves. If interest rates trend upward (+60 bps per year), liability growth on a market value basis would be around **-2.56%** per year (based on a 12-year duration for liabilities). Note: the market value of liabilities is priced at the risk-free Treasury discount rate (3% in example below). If assets could grow at just 5% per year on average, assets would outgrow liability growth (liability Alpha) by about 7.50% per year. In just five years, a 60% funded status grows to 88% with just a 5% asset growth rate... well below the ROA of 8.0%. A 70% funded ratio would grow to 108%... without help from contributions. The ROA, an

absolute return target, is not the proper pension focus. Relative returns... asset growth vs. liability growth is the true pension growth target. This requires a Custom Liability Index (CLI) to calculate liability growth on a frequent and accurate market value basis.

Moral: you want assets to outgrow liabilities not the ROA!

Assumptions: Interest Rates go up 60 bps per year

30-year Treasury = 3.00% >> 6.00%

Growth Rate = (2.56%) Annual

Liabilities duration = 12 years

	----- Annual Growth Rate -----			
	5.0%	6.0%	7.0%	8.0%
Assets	5.0%	6.0%	7.0%	8.0%
Liabilities	- 2.6%	- 2.6%	- 2.6%	- 2.6%
Alpha (Annual)	7.6%	8.6%	9.6%	10.6%
Funded Ratio	60%	87.8%	92.1%	96.5%
				101.1%

Duration Matching = Hedging Strategy... NOT De-Risking Strategy

Duration matching is designed to match the growth rate of liabilities. Since the duration of most liabilities are not provided by the actuary, most duration matching strategies use *generic* bond indexes as a proxy for liabilities. This is not an accurate or effective way to match liabilities. Liabilities are like snowflakes... you will never find two alike. Only through a Custom Liability Index (CLI) could you ever know the duration profile of liabilities which is quite interest rate sensitive. Since coupon bonds durations peak out at around 16 years, any liabilities longer than 16 years must be duration matched with high cost Treasury STRIPS. Moreover, buying a 5-year duration bond to match a 5-year duration liability, a 10-year duration bond to match a 10-year duration liability, etc., is not cost effective. Bond math is clear that the longer the maturity the lower the cost (purchase price) given the same yield. Moreover, the yield curve is usually positive sloping such that the longer bonds have higher yields which results in more cost savings. Please read my research paper "***How To De-Risk A Pension***" located in the research section of our web site www.RyanALM.com. **Futures, derivatives and interest rate swaps are certainly not de-risking strategies** since there are no funds to match and pay the liability benefit payment schedule. The objective of a pension should not be return oriented (i.e. the ROA). The 1990s should be a constant reminder of what happens when your focus is on a target return instead of the funded ratio and funded status. Had pension's *cash flow matched* liabilities in the 1990s when they had surpluses, there would be no pension crisis today!

Public Pension Watch List

Fed Drops Accounting Bomb on Public Pensions

The Federal Reserve announced in late September a change in accounting for state and local pension plans. The central bank revised its data for unfunded liabilities by applying a projected benefit obligation (PBO) method instead of the prior accumulated benefit obligation (ABO) approach. This change will increase unfunded obligations by \$2.3 trillion... more than double the previous total.

New York City sitting on a Debt Bomb

According to Crain publications, NYC has -\$69.7 billion in unfunded pension liabilities and another -\$79.4 billion in health benefit promises that were not divulged in their 2017 financial report. This did not include an additional \$40.9 billion in debt that was also not disclosed.

Kentucky Finances in Peril

According to Truth in Accounting, Kentucky has \$12 billion of assets versus debt of \$62.3 billion creating a \$50.3 billion deficit. This amounts to a taxpayer burden of -\$39,200 per taxpayer. The state pension has an unfunded debt of -\$40.6 billion included in these numbers. But there is also another \$3.1 billion in unreported retiree health care debt.

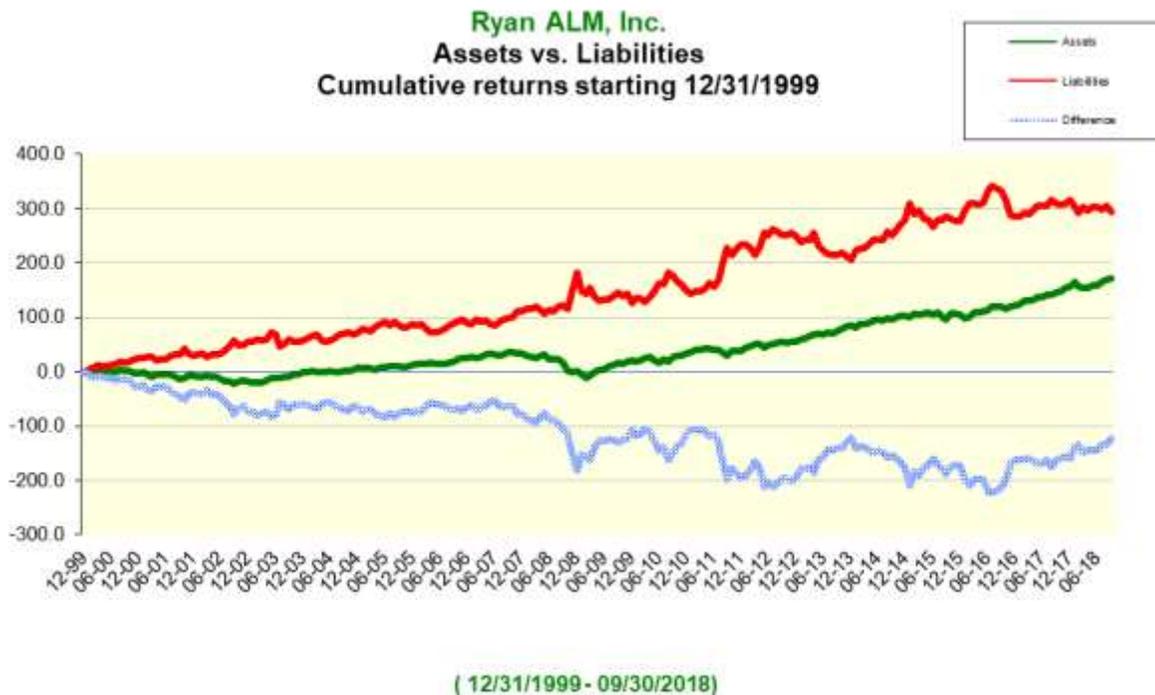
Illinois Drowning in Pension Costs

The state of Illinois and many of their municipalities are drowning in unsustainable pension costs. If state pensions were fully funded Illinois would spend about \$3.6 billion per year instead of \$10 billion in pension obligations. This difference is equal to 30% of the revenue from the Illinois individual income tax. The Illinois Supreme Court has said emphatically in unanimous decisions that the IL state constitution guarantees pension obligations and cannot be cut.

Ryan ALM Pension Scoreboard

The graphs below show asset vs. liability rolling 12 month and cumulative growth since 1999. Ryan ALM Benchmark Liability Index = **293.644%** growth while pension assets = **170.430%** growth for a difference of **-123.214%** suggesting any pension **Funded Ratio below 145.56%** in 1999 has a deficit today on a *market weighted* basis.

The Ryan ALM Pension Funded Ratio = 68.70% (starting at 100.00 on 12/31/99)



The World of Ryan Indexes

Custom Liability Indexes ... (Patent Pending)

The best way to price (discount rate) and understand the interest rate sensitivity of liabilities is the **Ryan Treasury STRIPS yield curve indexes** as a **LIABILITY INDEX BENCHMARK**. In March 1985, when STRIPS were born, the Ryan Financial Strategy Group (RFSG) created the **1st STRIPS Index**. Based upon these Ryan STRIPS indexes we created the **1st Liability Index** as the proper Liability Benchmark for liability driven objectives. The Ryan team has developed hundreds of Custom Liability Indexes (CLI). Similar to snowflakes, no two pension funds are alike with unique benefit payment schedules due to different labor forces, mortality and plan amendments. Until a CLI is installed as the benchmark, the asset side is in jeopardy of managing vs. the wrong objective (market indexes). **If you outperform generic market indexes, but lose to the CLI ... the plan loses!**

Ryan Treasury Yield Curve Indexes (Constant Maturity / Duration series)

In March 1983, the Ryan Financial Strategy Group (RFSG) created the **1st Daily bond Indexes (the Ryan Index)** as a *Treasury Yield Curve constant maturity* index series for each **auCTION** maturity series (from Bills to Bonds). In March 1985, the day after Treasury STRIPS were born RFSG created the **1st Treasury STRIPS indexes** as a *Treasury Yield Curve constant duration* series of 1-30 year maturities (30 distinct constant duration indexes + composite). The best way to measure interest rate risk is to use the Ryan Treasury Yield Curve Index series.

RAFI Fundamental Weighted High Yield Index Series + RAFI Investment Grade Index Series (PowerShares ETFs = PHB + PFIG)

In January 2010, Research Affiliates announced the creation of a series of bond indexes based on the RAFI fundamental weights. These include a short, intermediate long and composite Investment grade series and a short and intermediate High Yield series. Ryan ALM was honored and chosen as the index designer and calculation agent. In August 2010 the RAFI 1-10 year High Yield Index was launched as a **PowerShares ETF (PHB)**. There is also a Canadian hedged version (**PFH_CN**). In September 2011 the RAFI 1-10 year Investment Grade index was launched as a PowerShares ETF (**PFIG**). For more info on these ETFs and index, please go to:

www.Powershares.com (click on fixed income portfolios)

Ryan/Nasdaq 1-30 year Treasury Maturity Ladder (PowerShares ETF = PLW)

On October 11, 2007 PowerShares launched a fixed income ETF (**PLW**) based upon the Ryan/Nasdaq 1-30 year Treasury Maturity Ladder index. This index is an equal-weighted diversified portfolio of 30 distinct maturities. For more info on this ETF and index, please go to:

www.Powershares.com (click on fixed income portfolios)

Ryan ASC 715 (formerly FAS 158) Discount Rates

In 2006, Ryan ALM designed the FAS 158 yield curve index that prices any private pension liabilities in conformity to FAS 158 standards. We provide four distinct yield curves of AA corporate zero-coupon bonds in conformity to ASC 715.

Given the Wrong Index ... you will get the Wrong Risk/Reward!

To view all Ryan Indexes data go to: www.RyanIndex.com

Ryan Index is a Registered Trademark of Ryan ALM, Inc.

In October 2005, Ron Ryan terminated his license agreement with Ryan Labs to distribute and calculate the Ryan Indexes and Ryan STRIPS Indexes. Ron Ryan and Ryan ALM have no affiliation with Ryan Labs. Any use of the formulas, methodologies and data of any of the Ryan Indexes without Ron Ryan's written permission is prohibited.

Pension Solutions: Custom Liability Index and Liability Beta Portfolio™

(Patent Pending)

Ryan ALM offers a turnkey system of CLI + Liability Beta portfolio as a pension solution:

Custom Liability Index (Patent pending) - The first step in prudent pension management is to measure and monitor the liability objective frequently and accurately. Until liabilities are packaged as a **Custom Liability Index (CLI)** the asset side is in jeopardy of managing to the wrong objectives (i.e. market indexes). Only a CLI best represents the unique liability schedule of pensions. Just like snowflakes, no two pension liability schedules are alike due to different labor forces, salaries, mortality and plan amendments. How could a *generic market index* ever properly represent such a diverse array of pension liabilities? Once the CLI is installed the pension will now know the true **economic Funded Ratio** which should dictate the appropriate Asset Allocation, Asset Management and Performance Measurement. Ryan ALM is a leader in CLI as Ron Ryan was the inventor of the *first Liability Index* in 1991. In 2006, Ron won the *William F. Sharpe Index Lifetime Achievement Award!*

Liability Beta Portfolio (LBP) – The value added in bonds is small as every performance ranking study proves (1st quartile vs. median difference). **The best value in bonds is its cash flow to match and fund liabilities** as Dedication, Immunization and Defeasance have proven for decades. Since liabilities are dynamic calculations they need a CLI to monitor their risk/reward behavior. The *core* or Beta portfolio for a pension should be in high quality bonds that match and fund liabilities. A Beta portfolio is defined as the portfolio that matches the objective. If the true objective is liability driven then, by definition, the proper beta portfolio for any liability objective must be ... a **Liability Index Fund or Liability Beta Portfolio**. This requires a Custom Liability Index in order to be executed.

The Ryan ALM Liability Beta portfolio system will invest only in high quality securities that match the CLI. This provides our clients with the ***lowest cost and lowest risk portfolio***. It is the lowest risk portfolio since it has:

No Interest Rate Risk (matches CLI)
No Liquidity Risk
No Credit Risk
No Event Risk
No Prepay Risk

The Ryan ALM Liability Beta portfolio is the lowest cost portfolio since we will always out yield liabilities by more than our very low fee thereby guarantying each client **No Net Fee**. Moreover, the Liability Beta portfolio is a cash flow matching liability portfolio that fully funds liabilities thereby reducing the cost and volatility of contributions.

Disclaimer

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